The Foundry

VOLUME 66 • NUMBER 1

Editorial Staff

FRANK G. STEINEBACH
Editor

PAT DWYER
Engineering Editor

EDWIN BREMER
Metallurgical Editor

DON S. CADOT
Art Editor

New York . . . B. K. PRICE, L. E. BROWNE
Chicago . . . . . W. G. GUDE
Detroit . . . . . A. H. ALLEN
Pittsburgh . . . R. L. HARTFORD
Washington . . . . L. M. LAMM
London . . . VINCENT DELPORT

Advisory Staff

JOHN W. BOLTON
ALBERT E. GROVER
JOHN HOWE HALL
N. K. B. PATCH
HARRY A. SCHWARTZ

Business Staff

J. M. LATHROP
Advertising Manager

G. A. POPE
Assistant Advertising Manager

New York . . . . J. F. AHRENS
Chicago . . . . . L. C. PELOTT
Pittsburgh . . . . S. H. JASPER
Cleveland . . A. L. KLINGEMAN

BRANCH OFFICES

New York . . . . 220 Broadway
Chicago . . . Peoples Gas Building
Pittsburgh . 1650 Koppers Building
Washington . National Press Building
Detroit . 1010-2 Stephenson Building
London . . . . . Caxton House, Westminster, S.W.1

THE FOUNDRY is published monthly on the 15th of each month by The Penton Publishing Co., Penton Building, 1213 West Third street, Cleveland, Ohio. JOHN A. PENTON, Chairman, Board of Directors; E. L. SHANER, President and Treasurer; J. R. DAWLEY and G. O. HAYS, Vice-Presidents; F. G. STEINEBACH, Secretary.

Subscription: United States, Canada and Mexico, $2.00 a year, Great Britain and other Foreign Countries, $4.00 a year; single copies, 25 cents. Copies published three months or more previous to date of current issue, 50 cents each. Entered as second class matter at post-office at Cleveland under the act of March 3, 1879.

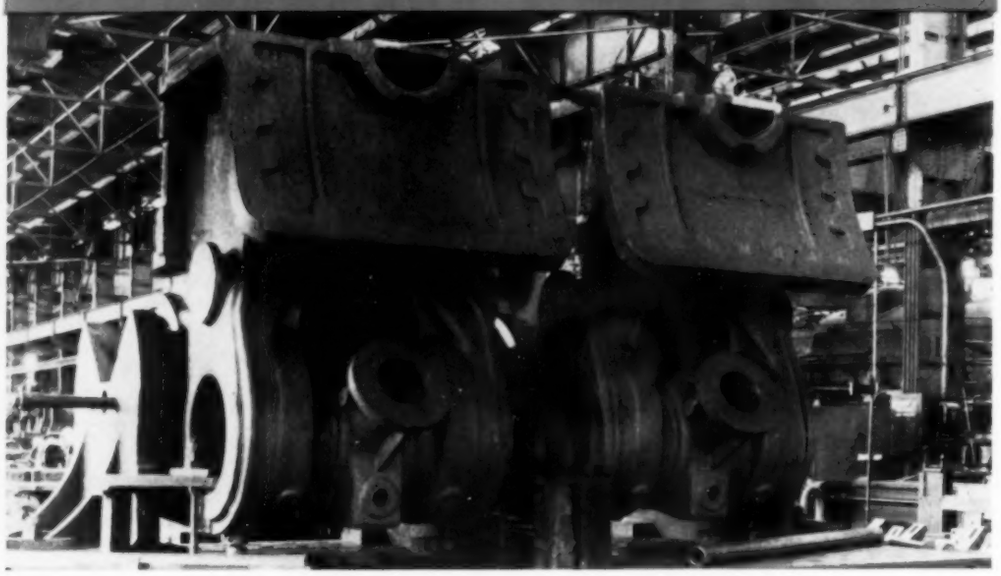
Copyright 1938, by the Penton Publishing Co.

Member: Audit Bureau of Circulations, Associated Business Papers, National Publishers Association.

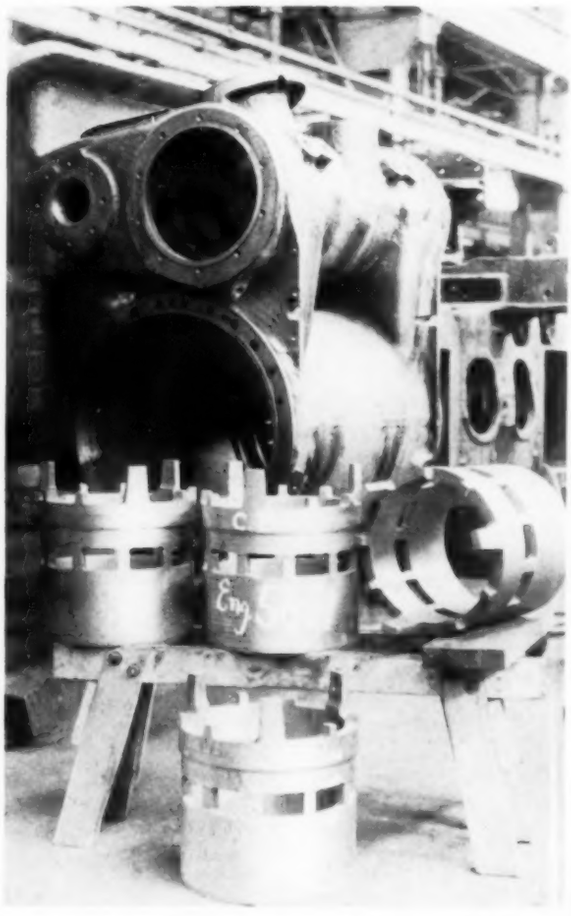
Contents for January, 1938

	Page
EDITORIAL	23
EXPERT TECHNIQUE NEEDED FOR QUALITY CASTINGS By Pat Dwyer	24
LATE SILICON ADDITIONS TO CAST IRON By V. A. Crosby and A. J. Herzig	28
EXHAUST REQUIREMENTS FOR FOUNDRY DUST CONTROL By John M. Kane	30
CONTROLS MOLDING SAND PROPERTIES By William G. Reichert	33
NEW FOUNDRY IS ON FOURTH FLOOR By William G. Gude	35
GATING NONFERROUS CASTINGS By N. K. B. Patch	36
SEE RECORD BREAKING FOUNDRY SHOW AT CLEVELAND IN MAY	37
QUESTIONS AND ANSWERS	38
MEN OF INDUSTRY	42
CORNELL CONFERENCE FEATURES SAND AND METAL PROBLEMS	49
THE ADVENTURES OF BILL By Pat Dwyer	55
VIEWING FOUNDRY DEVELOPMENTS AT SHORT RANGE	58
ACTIVITIES OF FOUNDRY GROUPS	61
OBITUARY	86
NEW EQUIPMENT FOR FOUNDRIES	88
FOUNDRY ACTIVITIES	96
NEW TRADE PUBLICATIONS	100

LINOIL CORES *Make rails..*



Transportation of nation moves on Linoil. Train, truck, airplane, auto, motorbike, steamboat, diesel or outboard motor—however you travel the chances are one hundred to one that vital castings in your conveyance are made with Linoil. All of which may not prove that Linoil is the best behaved and cheapest core oil to use, but it does prove that a lot of first-class Foundrymen think it is. Many have actually used millions of gallons of Linoil—they ought to know. Pictures on this page are locomotive castings made by Murray Iron Works.



ADVERTISING PAGES REMOVED

The Foundry

EDITORIAL • JANUARY

All Foundries Produced More Castings

NOTWITHSTANDING the business recession of the past few months, total production of castings by the foundry industry of this country during 1937 was the highest for any year since 1929. Early in the year, demand for cast products increased rapidly, and at the start of the second quarter the industry was working well above normal capacity. Inability to meet immediate needs of customers resulted in delayed deliveries and built up a considerable backlog which helped operations in late summer and early fall.

Steel foundries produced approximately 900,000 tons of castings during 1937. This is 75 per cent of the 1929 output and roughly 100,000 tons more than in 1936. Malleable iron foundries made close to 640,000 tons, slightly above 80 per cent of the 1929 total and an increase of 68,000 tons over last year. While no statistics are available for gray iron foundries, an estimate may be based on the increase in merchant pig iron production from 4,787,195 tons in 1936 to approximately 6,492,840 tons in 1937, or about 36 per cent. Tonnage increase is not conclusive evidence, due to the many variables, but the percentage increase is revealing and indicates a marked improvement in gray iron.

With an eye on the future, the foundry industry during 1937 engaged extensively in plant modernization and improvement programs. Reports of the Foundry Equipment Manufacturers' association show the average monthly index of equipment orders for the year, with December estimated, was 204.5. The base of 100 represents the average sales for the years 1922, 1923 and 1924. As confidence strengthens, further programs of rehabilitation and construction will go forward.

Predicting trends for 1938 is the special prerogative of the economists, who seem as usual to disagree to a considerable extent. Nevertheless it is apparent that due to the basic character of castings, in practically all manufacturing operations, future improvement in the demand for castings will be governed in the main by a general business recovery. Any increase in the industrial situation will be reflected immediately in increased foundry activity.

Progress During 1937

AN INTERESTING review of progress in the practice and products of all four classifications of foundries is contained in the annual issue of *Steel*, the "Yearbook of Industry."

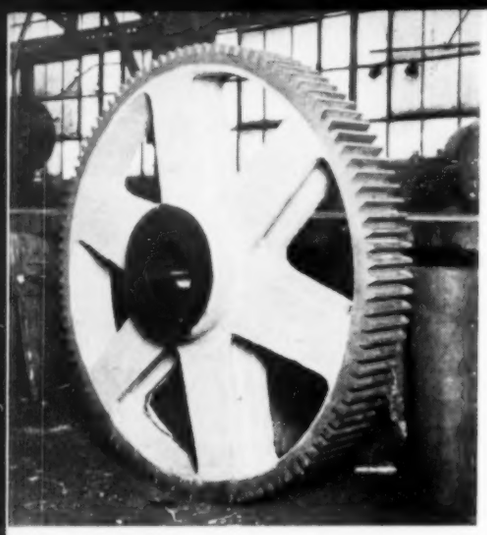
In steel foundries, attention is being given to application of more advanced forms of heat treatment. Increased interest is noted in impact values, both at normal and subnormal temperatures. Alloys are playing a more important part and production of stainless steel and heat resisting castings is increasing.

Greater use of alloys is apparent in gray iron foundries, and castings with higher physical properties are being provided. While the industry is moving toward further mechanization of operations, good business early in 1937 indicated a shortage of skilled men and apprentice training is increasing.

Considerable progress has been made in the metallurgy of malleable cast iron. Developments have been made in annealing furnaces, and the industry is making wider use of rapid annealing methods. More attention is being paid to reclamation, conditioning and handling of foundry sands and technical control has made an improved product possible.

Through laboratory control and the use of high grade materials, improvement in the quality of nonferrous castings is reported. Brass foundries have begun to practice methods of molding sand control and more attention is being paid to surface finish. Age hardening alloys are showing progress, and investigations have been made on the use of new alloys in nonferrous castings.

Frank G. Steinebach
Editor



Expert Technique Needed for

EXPERIENCE of the Fulton Foundry & Machine Co., Cleveland, over a period of many years serves to bear out the truth of a certain remark usually, whether rightly or wrongly, attributed to the late Ralph Waldo Emerson. The Sage of Concord is credited with the astute observation that if a man was to build a mouse trap better than any other, and further, even if this mouse trap builder carried on his activities far from the high roads of commerce, an impatient world would beat a pathway to the front door of his little cabin.

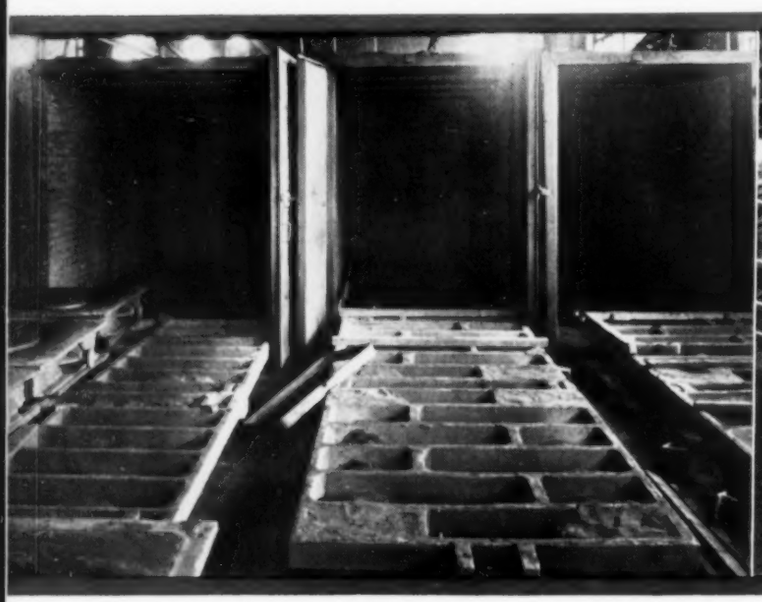


Fig. 1 (Upper left)—Large spur gear with sand cast teeth. Fig. 2 (Left)—Mold drying ovens are served by cast iron cars riding on cast iron balls which in turn travel in grooves at floor level. Fig. 3 (Right)—Dry sand cores with semispherical basin serve as copes and reservoirs through which castings are fed through small openings

For purpose of comparison, a captious critic might point out that a rather sizable gulf separates the shanty wherein the jolly old mouse trap builder plied his trade, no doubt whistling merrily the while, and a modern establishment capable of turning out 50 or 60 tons of casting per day. Also, the comparison breaks down to a certain extent in face of the fact that Cleveland, third foundry town in the United States, is not exactly a hamlet in the wilderness.

Another and probably more serious objection may be summed up in the statement: Times have changed. In these modern days the manufacturer of mouse traps or any other commodity must beat the gong, literally or figuratively to arouse and hold interest of customers. Under modern conditions the hermit mouse trap builder of Sleepy Hollow would be left holding the bag, while the populace streamed by on the distant highroad in the direction of the 5 and 10 cent store where an ordinary mouse trap could be secured for a nickel with a small portion of cheese thrown in for bait.

Revised and brought down to date according to the foregoing amendments and improvements—manufacture of a quality product and dissemination of information to that effect among present and potential customers—the mouse trap legend in its essential implication is as fundamentally sound as when first tossed off by the illustrious coiner. The Fulton Foundry & Machine Co., does a general jobbing gray iron foundry business but specializes to the extent that most of the castings are destined for use in ap-

Quality Castings

By PAT DWYER

plications where the service is unusually severe and where the specifications are unusually exacting in analysis, physical properties and conformity to required dimensions. Obviously expert foundry technique is involved in producing the metal and in making the molds for castings of this character.

Handling of incoming raw materials is greatly facili-

The deck forms a roof over a number of concrete sand bins in which the floor is level with the floor of the foundry. Hatches in the deck admit the sand which flows by gravity from the cars. A portable steel trough or flume extends from any given car to the hatch over the bin in which the sand is to be stored. It is claimed this method of unloading the sand has effected a considerable saving in cost.

Chute and sand bins form part of the installation

Fig. 4 (Left)—Partly completel loam mold for a marine engine cylinder with the pattern still in place. Fig. 5 (Right)—Casting for large crane drum cast in loam mold with dry sand cores on the inside. Metal entered the mold through gates at the bottom and top. Fig. 6 (Upper right)—Propeller cast from the hard, strong metal in which the company specializes

tated by the position of the foundry close to the railroad which in this section of the city is carried at a considerable height above the street level. The charging deck of the cupolas extends to the embankment of the railroad down which the materials roll from the cars as shown in Fig. 13. Incidentally this photograph was taken at a time when a gang of roofers was engaged in making repairs, which accounts for the presence of the miscellaneous material.

in a general revamping program inaugurated about a year ago with a view toward more economical operation. Results up to the present are claimed to exceed anticipation. Not only has the cost of handling the sand been reduced but the amount of new sand required, has been reduced to a remarkable extent. A mixing, reclamation and reconditioning unit installed by the National Engineering Co., Chicago, is the main factor, the pivot around which the sand economy program revolves. With this unit it is possible to control permeability by the amount of fines extracted, use a small amount of new sand or bond and moisture for workability, and to prepare a uniform sand in ideal moldable condition.

The unit consists of a hopper with a screen top

into which the sand is dumped from a grab bucket suspended from the crane. The sand is then delivered through an electric feed mechanism to a vibrating screen and thence on a conveyor over a magnetic separator and drops into a charging hopper. The hopper is part of an elevating rigging for delivering the sand mixture into the mixer. As the sand leaves the mixer it passes through an aerator to aerate the sand automatically as it falls from the mixer into boxes for transportation to any desired point on the floor.

The unit is hooded, and exhaust piping runs to critical points where dust forms. By regulating dampers in each of the exhaust outlets fines are removed as desired. All additions of new sand, bond, moisture, sea coal, cereal binder, etc., for either facing or core mixtures, are made in the charging hopper so that each batch of sand within reasonable limits may be controlled.

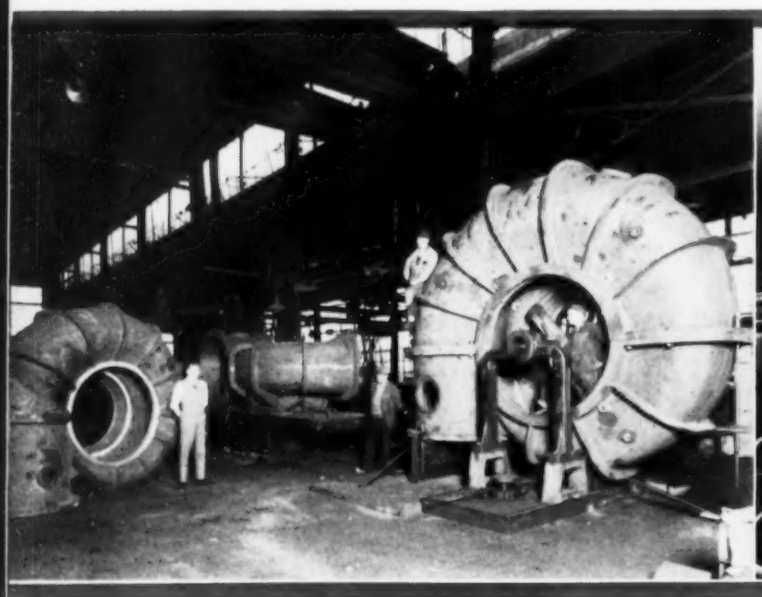
A certain amount of sand is prepared as green sand facing, but by far the greater amount goes into cores and into facing for dry sand molds. With the fines removed the permeability is increased to a remarkable extent over conditions existing before this system was installed. Core sand mixture and dry sand facing mixture practically are the same. Small cores and cores almost surrounded by metal are made from new sand bonded with oil. Where this condition obtains in large cores the corebox is faced with the oil sand mixture and the remainder of the space is filled with the old sand mixture. The cores are dried in several large gas fired ovens designed and built by the company and incorporating several interesting features in insulation and burner design.

Cars Move on Cast Iron Balls

General features of all the ovens are shown in Fig. 2, illustrating a battery of three ovens for drying the smaller molds made in the south bay of the foundry. The oven cars shown in the foreground are open sand castings with *V*-shaped guides on the bottom side resting on a number of loose cast iron balls. The balls in turn ride on similar *V*-guides mounted on concrete foundations in the floor. Total height of the oven in this way is reduced and available space utilized for drying purpose is increased to a material extent because the cars travel so close to the floor.

These truly round roller balls present an interesting example of the application of common sense to one phase of the metal shrinkage problem in casting manufacture. In apparent opposition to the theories usually held on the subject, each of these castings is fed successfully through a 1-inch riser on the top. The apparent anomaly is explained by the fact that the 1-inch riser is only about ½-inch in length and is topped by a feeding basin or reservoir. So long as the metal in the basin contains iron at a higher temperature than that in the ball, it will feed through the narrow 1-inch neck.

Application of this method and principle is shown in Fig. 3, green sand molds for solids cast iron slugs, 12 inches diameter, 2 feet in length. Later, in the machine shop the slug is cut into various size disks



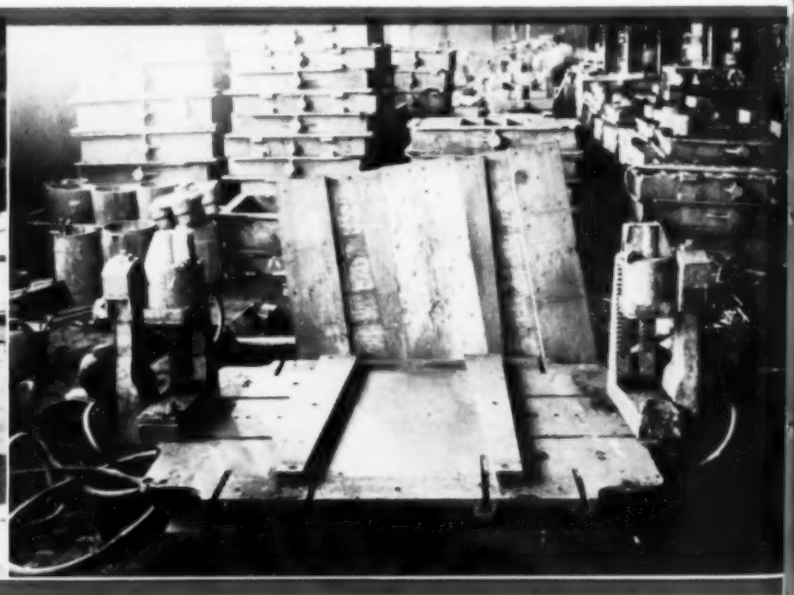
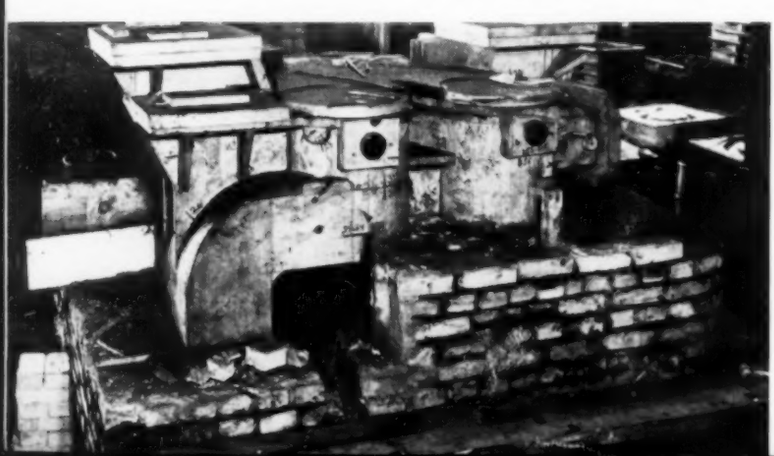


Fig. 7 (Left)—Section of machine shop with several centrifugal pump casings on the machines. Fig. 8 (Right)—All pattern boards are provided with dovetail slides on the bottom for attachment to corresponding projections on the molding machine table. Fig. 9 (Below)—View from opposite side of loam mold for cylinder shown in Fig. 4

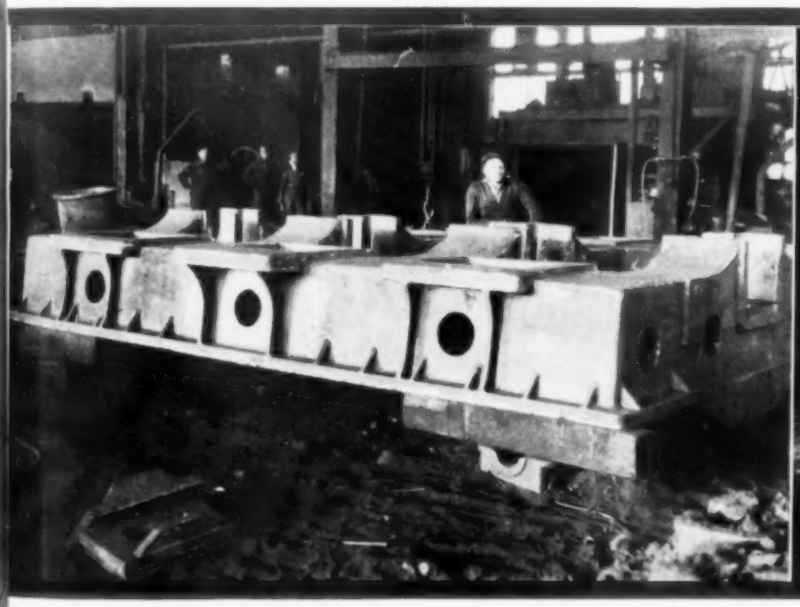


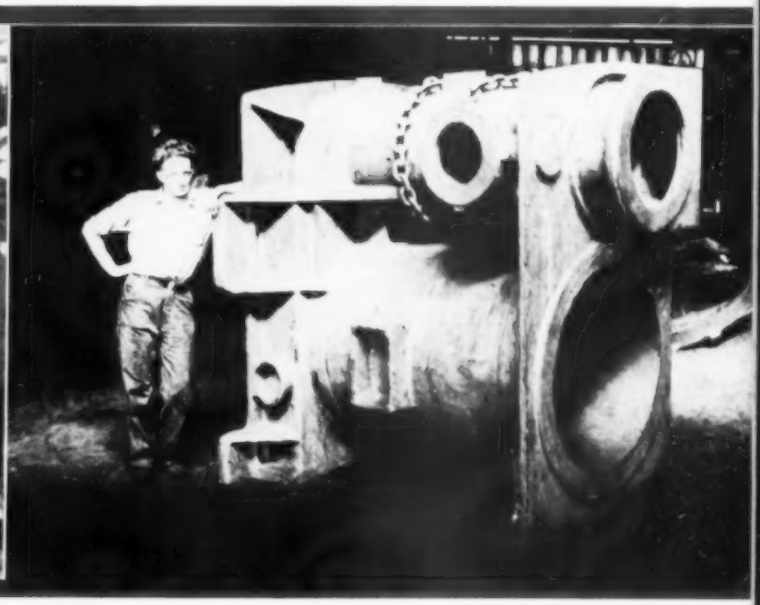
and rings and obviously must be clean and solid throughout. The desired result is secured by covering each mold cavity with a dry sand core containing a semicircular depression or basin. A small opening, ¾ or 1-inch diameter forms a connection between the bottom of the basin and the top of the casting. At this point the sand is between ¼ and ½-inch thick.

Metal is poured into the mold through a gate near the top in the usual manner. Pouring is stopped when the rising metal touches the dry sand core cover. The basin then is filled with fresh, hot iron, which naturally is at a higher temperature than the metal in the mold. The metal in the basin is covered with a handful or two of a good insulating material in powdered form and no further attention is paid to it. When the casting is shaken out it is perfectly solid without piping or shrinkage. The narrow connection between casting and feeding basin is easily broken and there is no expensive chipping and grinding.

While many of the small and medium weight castings are molded in green sand, the majority, particularly the larger castings are made in dry sand

Fig. 10 (Left)—The marine engine bed plate shown in this illustration and the steam cylinder shown at the right in Fig. 11 represent a high degree of foundry skill and technique. Fig. 12 (Right above)—Loam mold for the crane drum shown in Fig. 5 as it was lowered into pit for casting





or loam molds. Choice between the two latter mediums is decided principally by the available rigging, which affects the total cost. However, as in many other phases of job shop operation, the choice also is dictated by one or a combination of other factors.

Dry sand or loam molds properly made, offer an insurance against blow holes, scabs, buckles, shrinks, swells and other forms of defects. This type of mold is solid and rigid and as a result the casting is true to size, shape and dimension. The sprues and gates provide a clean, smooth passage for the metal. There is no erosion of the passage walls, no sand carried in with the stream of metal to appear later as dirty, spongy or segregated areas in the casting. It is claimed that the extra cost of loam molds is more than offset by the reduction in scrap and by the reduced cost of cleaning the castings.

A superior grade of metal prepared according to a patented process based on the discovery that calcium silicide causes graphitization of the cementite without otherwise affecting the composition, is used for the castings. This process is a development of experiments carried on in the early 1920's independently in the United States by G. F. Meehan and by Oliver Smalley in England which culminated in 1926 in the formation of the Meehanite Metal Corp. when they joined forces. The Fulton Foundry & Machine Co., operates under license from that corporation. A. C. Denison, president, Fulton Foundry & Machine Co., is chairman of the Meehanite (*Please turn to page* 68)

Late Silicon ... To

By
V. A. CROSBY
and
A. J. HERZIG
Climax Molybdenum Co., Detroit

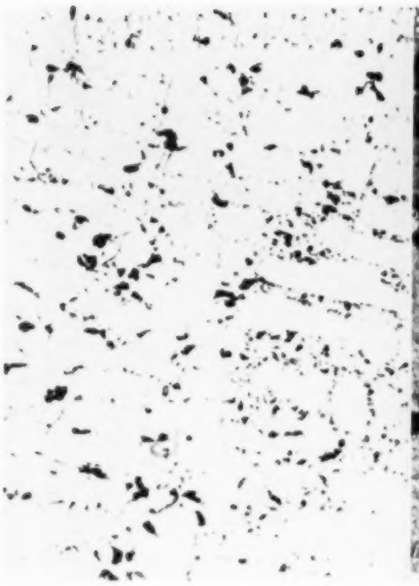


Fig. 1

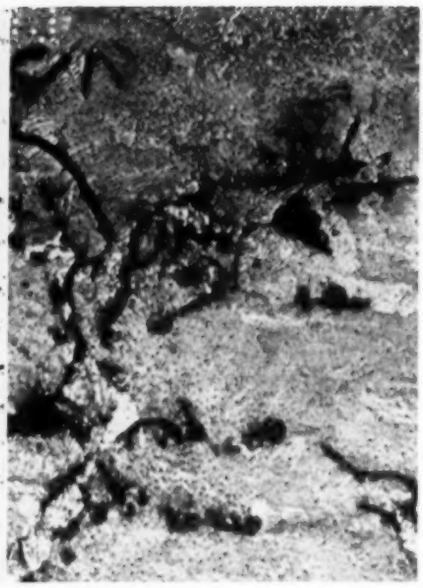


Fig. 2

Chemical Analysis	Per Cent	Physical Properties		
Total Carbon	3.08	Transverse Test	2266-2332	lbs.
Combined Carbon	0.58	Deflection	0.187-0.194	in.
Graphitic Carbon	2.50	Brinell Hardness		
Manganese	0.88	(Edge)	228-228	
Silicon (original	2.17	Tensile Strength.....	35,650-38,650	p.s.i.
(late)	...	Brinell Hardness		
(Total)	2.17	(Center)	217-217	

AS MANY metallurgists and foundrymen know, late additions of silicon to gray iron often produce structures and properties considerably better than might be anticipated judging solely from the amount of silicon added. Based on their experience with silicon additions, some foundrymen have adopted a convenient rule-of-thumb practice that late additions of silicon are about three times as effective as an equivalent amount of silicon melted with the charge.

What is not so widely known, perhaps, is the actual relationship between physical properties obtained and time and quantity of late silicon additions.

Chemical Analysis	Per Cent	Physical Properties		
Total Carbon	3.11	Transverse Test	2420-2530	lbs.
Combined Carbon	0.61	Deflection	0.235-0.250	in.
Graphitic Carbon	2.50	Brinell Hardness		
Manganese	0.80	(Edge)	223-223	
Silicon (original)	1.50	Tensile Strength	42,000-43,120	p.s.i
(late)	.58	Brinell Hardness		
(Total)	2.08	(Center)	217-217	

Fig. 3

Fig. 4

Chemical Analysis	Per Cent
Total Carbon	3.04
Combined Carbon..	0.63
Graphitic Carbon..	2.41
Manganese	0.89
Silicon (original) .	1.00
(late)	1.15
(Total)	2.15

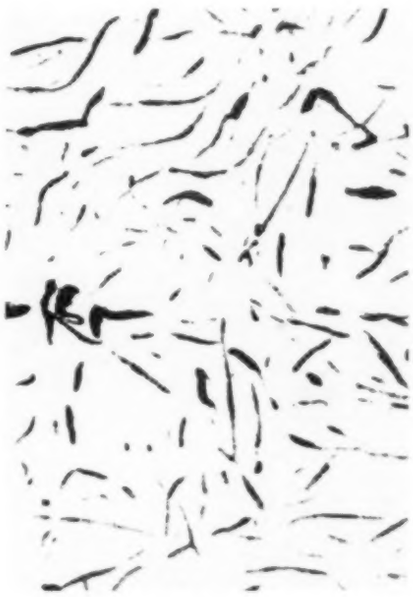


Fig. 5

The problem of adding silicon to cast iron was the subject of a series of experiments recently conducted at the Climax Molybdenum laboratory in Detroit. The results of these tests, which seem to be reasonably representative, are summarized in Fig. 11.

The data in the chart were compiled by averaging results of two tests on bars taken from each of five heats of identical original analysis, with varying proportions of silicon being added as late additions. Nominal analysis was total carbon 3 per cent; silicon, 2 per cent; and manganese, 0.90 per cent.

Each heat was melted down in a 30-pound induction furnace equipped with a silica crucible. Charges consisted of low carbon ingot iron croppings and graphite granules. Silicon, in the proportions indicated, was added with the iron and carbon, except in heat No. 1237, Figs. 9 and 10. Heats were cast in thoroughly dried, baked sand molds to produce A.S.T.M. type *B*

Additions

Cast Iron

Fig. 7

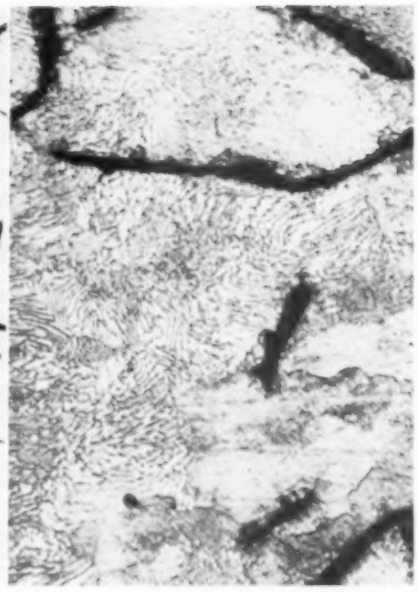


Fig. 8

Chemical Analysis	Per Cent	Physical Properties		
Total Carbon	3.05	Transverse Test	2990-2860	lbs.
Combined Carbon	0.67	Deflection	0.350-0.320	in.
Graphitic Carbon	2.38	Brinell Hardness (Edge)	217-217	
Manganese	0.89			
Silicon (original)	.50	Tensile strength	48,200-48,600	p.s.i.
(late)	1.57	Brinell Hardness (Center)	212-212	
(Total)	2.07			

Fig. 6

Physical Properties	
Transverse Test	2840-2895 lbs.
Deflection	0.314-0.335 in.
Brinell Hardness (Edge)	217-217
Tensile Strength	47,600-47,500 p.s.i.
Brinell Hardness (Center)	212-212

bars from which all data were taken. Superheating temperatures were 2750 to 2775 degrees Fahr. and pouring temperatures were held within the limits of 2650 to 2675 degres Fahr.

Time of late additions of silicon was standardized at 5 minutes before pouring. Additions as late as 15 minutes before pouring were relatively ineffective. To eliminate all variables except time and proportion of silicon added, the same superheating and pouring temperatures were maintained throughout the tests. Micrographs and properties of individual bars are shown in the accompanying illustrations.

Examination of the microstructure of heat No. 1234, Figs. 1 and 2, with all silicon added with the charge, shows the presence of dendritic graphite as finely dispersed particles in the matrix. A definitely outlined dendritic pattern unmistakably is evident. That type of structure gave the lowest physical property values of the five laboratory heats.

By adding as little as 25 per cent of the total silicon 5 minutes before pouring, heat No. 1233, Figs. 3 and 4, a remarkable change in microstructure has been effected. The dendritic pattern has disappeared. Instead, we find the familiar graphite flakes, well distributed throughout the matrix. An appreciable increase in physical properties accompanied these structural changes.

When half the silicon was added with the charge and the remaining half was added 5 minutes before pouring, a further change in microstructure and improvement in physical proper- (*Please turn to page* 73)

Chemical Analysis	Per Cent	Physical Properties		
Total Carbon	3.09	Transverse Test	2442-2510	lbs
Combined Carbon	0.64	Deflection	0.245-0.250	in.
Graphitic Carbon	2.45	Brinell Hardness (Edge)	217-217	
Manganese	0.88			
Silicon (original)	...	Tensile Strength	39,400-39,550	p.s.i.
(late)	2.13	Brinell Hardness (Center)	207-207	
(Total)	2.13			

Fig. 9

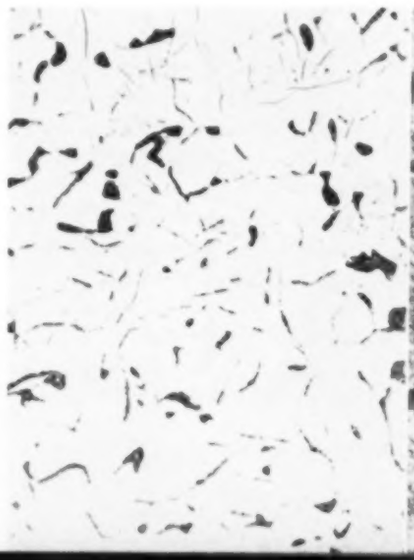


Fig. 10

Exhaust

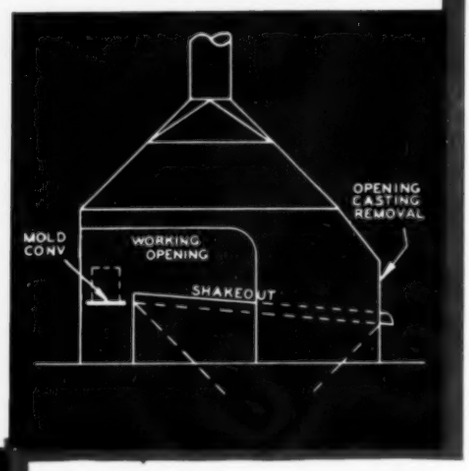
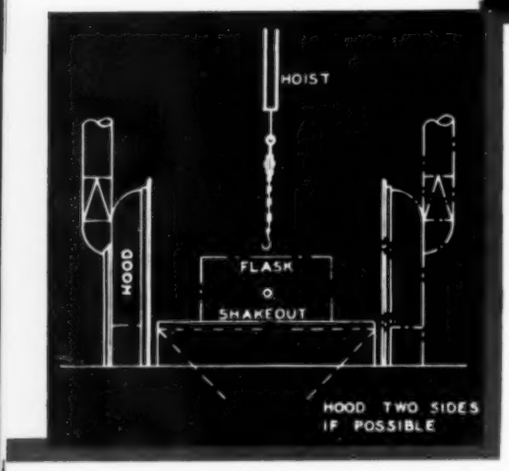


Fig. 1 (Right)—An overhead hood method of removing dust from the shakeout

Fig. 2 (Below)—Large volumes of air must be exhausted through side hoods



WITH the obviously wide variation in equipment design and foundry procedure, any engineering data presented must be used only as a guide for average requirements, and when necessary should be modified in accordance with intensity of dust generation and the type of hood or enclosure which it is possible to employ under the particular circumstances.

This article, and the one which will follow, was prepared under the auspices of the Engineering committee of the Dust Control Equipment association. While that committee has reviewed Mr. Kane's paper and endorses the general premises, the committee directs attention that its endorsement is given with the above explanation.

The Editors.

ALTHOUGH layout, procedure and equipment differ for practically every foundry, it is possible to formulate some basic principles for the control of dust-producing operations common to every foundry. The exhaust air requirements for the prevention of dust dispersion into the workrooms depend on the dust, nature, concentration, and particle size; effectiveness of enclosures or hoods; and natural path of dust travel.

The largest amount of exhaust air required for dust control will be applied to those operations incident to the shaking out of the casting. Effective confinement of dust from that source must include exhaust provisions for all operations handling the sand from the time of shaking out the flask until water is added to the sand when it is reconditioned for re-use. Similar provisions must be made for core sand if cores are knocked out separately after the casting has been removed from the flask.

From the shakeout the casting is transferred to the cleaning room where dust-laden air must be exhausted from blast cleaning, tumbling, and grinding operations.

Data presented are based on average conditions and have been collected with the hope that they will prove helpful in selection of air requirements. When necessary volumes have been determined, economical grouping of exhaust points can be made and piped to suitable dust collecting equipment.

In this discussion, it must be assumed that castings are shaken out in one location on some form of grate or grill which allows the sand to fall through the deck to a hopper or confined space below. The two most vital factors affecting volume of air exhausted from shakeout grates are the temperature of the castings and the degree and design of hoods or enclosures.

When castings are shaken out while red hot, the breaking of the flask is accompanied with an explosive burst of freed steam, fumes, and fine particles of sand, bond and sea coal. Sufficient exhaust capacity must be available to draw this fast rising cloud into the exhaust system. If the castings are cold or only warm when shaken out, the dust is not liberated as violently and lesser air volumes will be sufficient to prevent dispersion.

The hooding or enclosing of the shakeout operation requires more careful study than any other dust-producing operation. Degree of enclosure and location of hoods will depend on the procedure of placing flasks on the shakeout grate, and the removal of cope, drag and casting.

Overhead Hood Covers Grate

Whenever possible, the exhaust air should be withdrawn through an overhead hood, Fig. 1, which covers the entire grate and is located as close to the grate as possible. Sides should be added to enclose the operation except for necessary working openings which will be required in upsetting the flask, discharging the casting, and removing the cope and drag.

Such a hood will require the exhaust of a minimum air volume. The dust, steam and fumes tend to rise vertically and are deflected by the overhead hood. The side enclosures decrease the area through which an indraft must be maintained to prevent dust escapement.

For many shakeouts, it is impossible to install overhead hoods without seriously interfering with the operation. Larger flasks containing heavy castings frequently are lifted onto the shakeout grate by jib or overhead cranes, or the cope and castings are removed while the drag is still on the mold conveyor. Side

st Requirements...

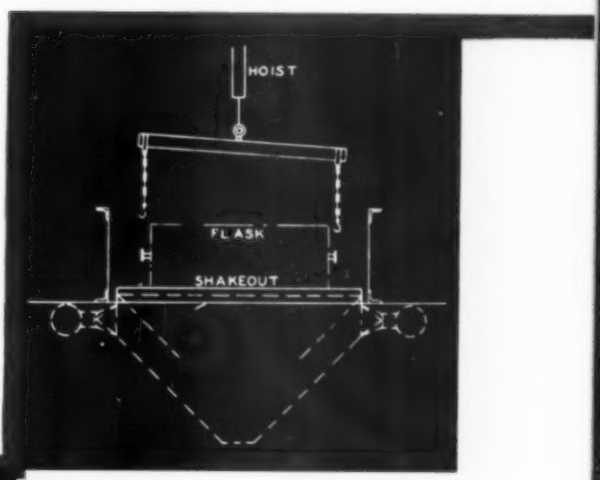
For Foundry Dust Control

By JOHN M. KANE
American Air Filter Co., Louisville

hoods or down draft must be used to deflect the rising dust, either horizontally or downward, by the movement of the exhaust air.

Larger air volumes must be exhausted from side hoods, Fig. 2, or down draft hoods, Fig. 3. When air is drawn into a hood, its velocity diminishes rapidly outside the hood mouth. Consequently, even with the exhaust of large volumes, sufficient velocities to direct the dust cannot be maintained at an appreciable distance from the hood and a general rapid change of the surrounding air must be relied on to prevent dust from traveling vertically upward and escaping to the atmosphere.

Downdraft hoods drawing air through the shakeout grate are even less satisfactory than side exhaust hoods. When castings are shaken out hot, it is difficult to prevent dust escapement with that type of exhaust. Larger air volumes are required and the sand and casting frequently block the path of exhaust air travel during the interval when most fine dust is generated. Such an arrangement puts a heavy load on collection equipment as an unavoidable percentage of large grain sand will be removed with the fines. Where overhead hoods cannot be applied, an air curtain system, Fig. 4, has been developed which confines the dust with moderate air volumes more effectively than is possible with side or downdraft hoods. This system is based on the combination of a small amount of air under pressure driving the smoke and dust cloud toward an efficient suction hood located on the opposite side of the shakeout grate. In this arrangement, the air movement surrounding the grate is so controlled that escape of the dust is prevented. Necessary air volume is a function of the area of the shakeout. Usual requirements for the



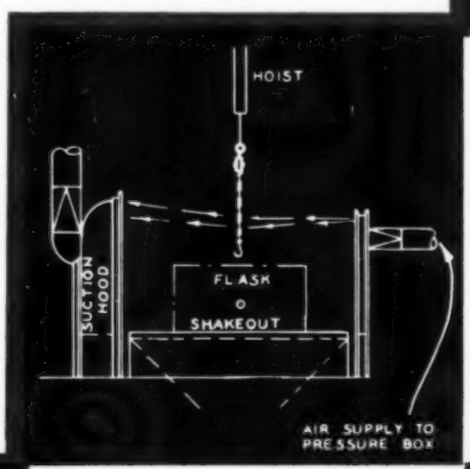
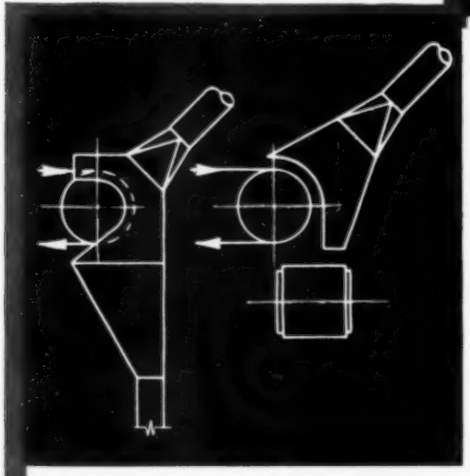


Fig. 3 (Above)—Down draft method of carrying away dust from the shakeout

Fig. 4 (Left)—An air curtain system has been developed to confine the dust

Fig. 5 (Lower left)—Exhaust hoods should be provided at transfer points

Fig. 6 (Below)—Screens may be enclosed completely



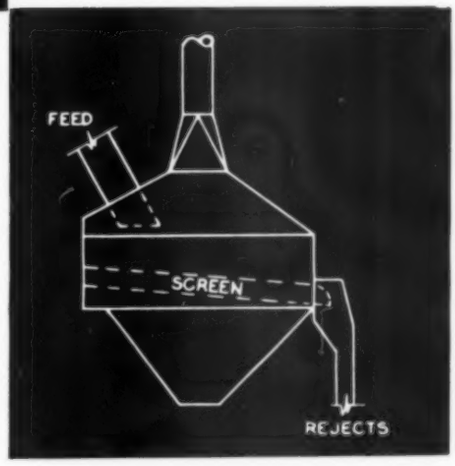


Table I

Air Volume for Shakeout Exhausts

Type of Hood	Hot Castings	Warm or Cold Castings
Overhead Hood	300 feet per minute through working openings but not less than 200 cubic feet per minute per square foot of gross grate area.	200 feet per minute through working openings but not less than 150 cubic feet per minute per square foot of gross grate area.
Side Hood	400 cubic feet per minute per square foot of gross grate area.	300 cubic feet per minute per square foot of gross grate area.
Downdraft		200 cubic feet per minute per square foot of gross grate area.

Table II

Exhaust from Belt Transfer and Magnetic Pulleys

Belt Width—Inches	Branch Size—Inches
to 18	5
18 to 24	6
24 to 36	7
Over 36	8

Table III

Exhaust Branch Sizes for Bucket Elevators

Width of Bucket—Inches	Branch Size—Inches
to 12	5
12 to 16	6
16 to 20	7
20 to 24	8
Over 24	10

various arrangements previously discussed are shown in Table I.

From the time the sand is removed from the flask at the shakeout to the point where it is reconditioned for re-use, it must be carried on belts and elevators over magnetic pulleys, through screens, to bins, mullers, and areators. Endless belts generally are used and dust is generated at each transfer point where sand drops over the head pulley to cross belts, or other equipment.

Exhaust hoods, Fig. 5, should be provided at all transfer points to prevent dust escaping. Customary branch pipe sizes are shown in Table II.

In some cases where hot sand is handled on fast moving or inclined belts, it is necessary to enclose the entire belt with a U-shape covering which can be removed for belt inspection or maintenance. After water has been mixed with the sand, exhaust from belt transfer points normally is not required in the sand return from conditioning equipment to the molding floor.

Bucket elevators, used to elevate sand to storage bins, sand screens, or conditioning equipment, should be provided with tight casings which should be ventilated. As the buckets are filled at the boot, air is displaced by the sand. This displaced air in addition to air drawn in by the fan action of the moving buckets, is exhausted through hoods, Fig. 7, located either at the head or boot.

Customary branch sizes and air volumes are shown immediately at the left in the accompanying Table III.

Elevators handling hot sand should be exhausted at the head. When handling cold materials, the exhaust connection can be made at either the head or boot. Elevators over 30 feet high should be exhausted at both head and boot.

Like all dust-producing equipment, sand screens should be enclosed as far as possible. In case of screens located above sand bins, the enclosure over the bin top can be designed to enclose the screen as well. The required exhaust volume will depend primarily on the degree with which the screening device can be enclosed. Cylindrical screens normally will require exhaust of larger volumes than the flat deck, vibrating type, if removal of fines or cooling of sand is required. Enclosed hoppers must be provided to catch the screened material, or dust clouds will be generated as the falling material lands.

Tight Enclosures Are Essential

It usually is possible to provide a complete enclosure, Fig. 6, around the screens. Cylindrical screens as a rule are equipped with tight enclosures which are essential for effective dust control. Volume of air exhausted will vary, depending on the cooling to be obtained and whether dust confinement only is required or if aspiration to remove the fines is desired.

In many cases, the feed comes from a bucket elevator and the connection from the elevator spout to the screen enclosure can also be enclosed. When sand is delivered by belt conveyors, the enclosure for the head pulley of the conveyor can be fitted to include the inlet opening to the screen.

Storage bins for dry sand will require exhaust connections in any complete system of foundry dust control. Air is displaced by the (*Please turn to page* 74)

Table IV

Exhaust Volumes from Sand Screens

Flat Deck Screens

Type of Hood or Enclosure	Required Air Volumes
Totally Enclosed	75 cubic feet per minute per square foot of screen area but not less than 200 feet per minute through inspection openings.

Cylindrical Screens

Largest Diameter Inches	Air Volumes (To Confine Dust Only) Cubic Feet per Minute	Air Volume (For Aspiration) Cubic Feet per Minute
to 30	1500	3000
30 to 48	2000	4000
48 to 60	3000	5000
60 to 72	4000	6000
Over 72	5000	7500

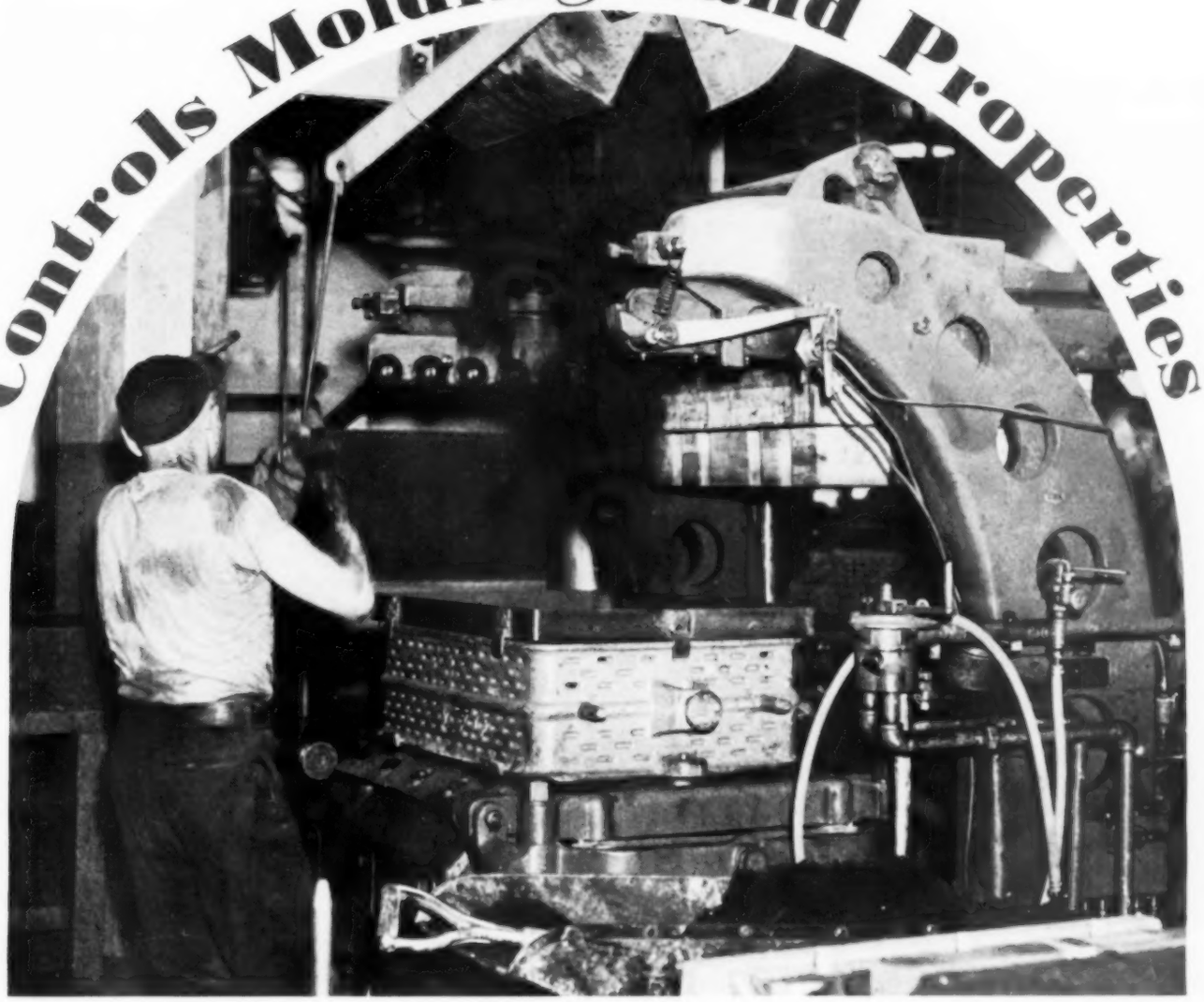
Table V

Exhaust Volumes for Mixers

Mixer Diameter Feet	Air Volume Cubic Feet per Minute
4	650
6	900
8	1200
10	1500

But not less than 150 feet per minute through necessary working or feed openings.

Controls Molding Sand Properties



This is the first of two articles abstracted from a paper presented at the first New England Regional Foundry conference held at the Massachusetts Institute of Technology, Cambridge, Mass. The second article will appear in an early issue.

By WILLIAM G. REICHERT
Metallurgical Engineer
Singer Mfg. Co., Elizabeth, N. J.

MOLDING sand is a broad subject for discussion but it is one of the major problems confronting all foundries because it affects the surface quality of the product, cost of production, and foundry losses. It is estimated that over 50 per cent of all foundry defects are caused either by the misuse of or by the use of improper sand. It is gratifying to note that foundrymen are beginning to realize more and more the importance of a study of the sand conditions as applied to their particular foundries.

The American Foundrymen's association in recent years has devoted considerable time and effort to molding sand and molding materials. As a result definite methods for testing sand and a better understanding of the functions and the influence of the various ingredients of the molding sand exist. The relative composition and properties of good molding sand for different types of castings only can be secured by testing methods.

What are the fundamental properties of a foundry sand which make it suitable for molding purposes?

Permeability: A good molding sand must have sufficient permeability when moderately rammed to allow the air in the mold as well as the steam and gases generated when the mold is filled with iron to escape rapidly, thereby preventing the scabbing of the mold and the blowing of the iron.

Moisture Content Is Important Factor

Strength: Sand should possess sufficient green strength to prevent dropping, particularly in handling the mold, and sufficient dry strength, when dried either in the oven or by the heat of the incoming metal to prevent cutting and washing. Since both the green and dry strength depend to some extent upon the moisture content of the sand great care should attend the tempering operation.

Fineness: Sand grains must be fine to yield a satisfactory mold surface if the castings are required to be smooth and clean. A refractory sand is necessary which

will not fuse or sinter badly when subjected to molten metal temperatures as required in ordinary foundry practice.

Furthermore some types of molding machines require a sand that will compact considerably more than others and may even require a different type of sand depending on the method of ramming.

In general, since the choice of sands with respect to fineness is determined both by permeability requirements and by casting surface requirements, better results may be obtained by the proper selection of simple sand of a uniform distribution than by mixtures of coarse and fine sands. If sufficient coarse sand is used in the mixture to insure permeability it will be this coarse constituent that determine the surface character of the mold and it will determine quite definitely the surface character of the casting.

Tests Necessary for Intelligent Control

Sand tests are desirable for a number of reasons:

1. First of all a record of the physical properties can be made so that results may be duplicated.
2. It provides a ready guide for blending sand for certain types of work.
3. It affords a ready means of judging new sands and establishing specifications so that a uniform sand may be furnished.
4. It aids in conservation of sand by preventing new sand additions until advisable.
5. Its most important feature is in the fact that the condition of the sand pile may be determined and corrected before it deteriorates to the point where bad castings are produced.

Sand control resolves itself essentially into three steps:

1. It is first necessary to standardize on the sand properties which have been found most suitable for the castings to be made. In this connection it is necessary to coordinate the various defects with the sand test data. Establish limits for satisfactory results. These standards then should be maintained within predetermined limits.
2. Tests of the heaps must be made at regular intervals to keep informed of any changes that may occur in the sand properties.
3. Finally the proper addition to the heaps must be made as indicated by the tests and it is also important to properly incorporate these additions.

The question naturally arises, What test should be made? Permeability, moisture and green strength are of first importance with dry strength and fineness ranking next.

Moisture is extremely important because it influences strength, permeability, deformation and resilience. As the amount of moisture in the sand increases the gas content increases. For each cubic inch of sand which is dried approximately 27 cubic inches of water vapor will be evolved for each per cent moisture contained in the sand. For example, a sand containing 7 per cent moisture will give off approximately 190 cubic inches of water vapor for each cubic inch of sand dried. If the moisture content of the sand is exceptionally high and the sand fine, this water vapor will set up a back pressure against the metal and increase the difficulty in producing perfect castings.

Control of moisture may be divided into two parts, the metering of the water, and checking the moisture by a moisture test. Even in floor molding operations a water meter may be attached to the tempering hose to secure a more accurate control of moisture.

Permeability is controlled by testing sand each time it is tempered and making suitable additions, according to results of the test, and also by making mold hardness tests at the machine. If a sand is too open or too close indicating a high or low permeability, a suitable sand is added to remedy this condition. Permeability depends largely on the size and shape of the grains, moisture content, sea coal, and mold hardness. For maximum permeability grain size should be uniform.

While permeability readings may vary somewhat and yet not cause particular difficulty, general experience shows foundry losses are increased considerably when permeability is not held within close limits. Air contained in the mold as well as gases derived from moisture in sand and from oxidation and distillation of sea coal are significant only in respect to pressure which they create in passing through the mold.

Control Velocity Pressure of Gas

Reducing velocity pressure of gases through the mold during pouring will reduce many casting defects, particularly those caused by blow-holes and sand-holes. Blow-holes are caused by the gas pressure while air steam and other gases in their rapid escape from the mold tend to dislodge sand particles which are deposited in another section of mold cavity forming sand-holes.

Green strength in a molding sand is important; the sand must possess sufficient cohesiveness to be moldable. Strength is controlled by frequently testing sand and making suitable additions of clay, refuse sand and new sand. Green strength is affected by the moisture, the quality, quantity and distribution of bonding material. Maximum strength is obtained when a sand contains just sufficient moisture to saturate the clay. Insufficient or excess moisture has a tendency to lower both the bond and permeability.

For economy, the quality and quantity of the bond which determines the strength of the sand is of prime importance. New molding sand consumption may be reduced considerably by addition of a highly bonded new sand or a bonding clay. Heap sand need never be thrown away if a good bonding sand or clay is used but it is essential to obtain a bonding material with sufficient clay to sustain the strength and then add only enough silica sand to maintain the grain size.

As iron is poured into a green sand mold it is dried by the heat of the metal and in this condition it must possess sufficient strength to resist cutting and washing action of iron. Dry strength of a sand depends upon quantity and quality of clay substance, also on whether organic binders are present and especially upon moisture content. Dry strength may be increased by increasing the quantity of clay or colloidal matter, the moisture content, and by addition of pitch.

An excessive hgh dry strength often is objectionable. For example—metal shrinking (*Please turn to page* 76)

New Foundry Is on Fourth Floor

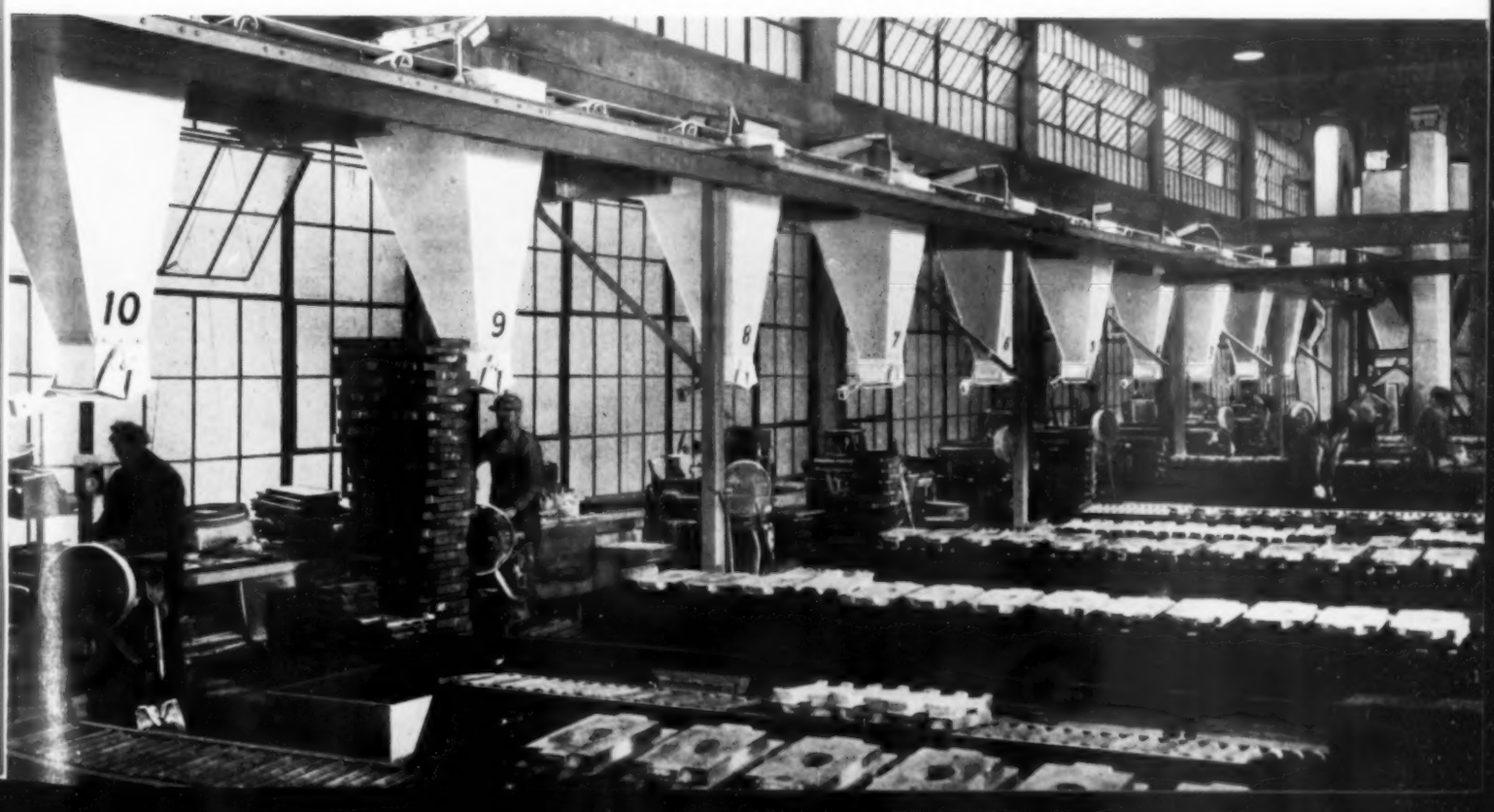
By WILLIAM G. GUDE

MODERN equipment and good housekeeping have done much to dispel the old notion that a foundry necessarily is a breeder of dirt and smoke. A good illustration of the change that has occurred in this respect can be found in the new nonferrous foundry of Liquid Carbonic Corp., Chicago.

That company recently relocated its foundry in a new section of its large Kedzie avenue plant. The casting shop is situated on the fourth floor of the building, and the combination of a monitor type roof, adequate height from the ground and freedom from closely adjoining buildings helps to provide good ventilation throughout the foundry.

While the new installation was not made primarily to provide larger capacity, improved efficiency has resulted from a rearrangement of facilities, the use of mechanical sand handling equipment and the cleaner working conditions. Brass castings up to about 800 pounds for the company's own use in the manufacture of bottling equipment are (*Please turn to page* 80)

Fig. 1 (Above)—Pouring a large floor mold. Fig. 2 (Below)—View along one side showing molders' hoppers and gravity-roll, mold conveyors



GATING

Nonferrous Castings

By N. K. B. PATCH

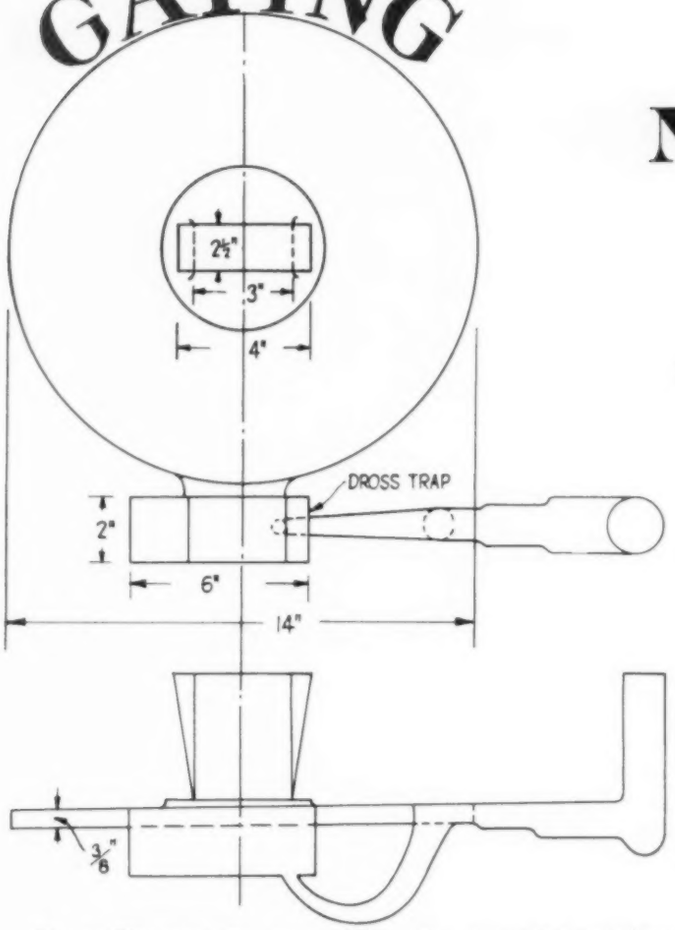


Fig. 1—Diagrammatic representation of a successful procedure developed for obtaining sound disks free from dross in silicon bronze, according to Roast

IN GENERAL, gating simply is provision of the nessary passages to lead the metal to the mold cavity. While it would be ideal to be able to pour a casting without gates, no such thing is possible. Metal must be led into the mold to fill it. If by some magic we could fill the mold without gates, runners or sprues, we probably would eliminate some of the causes of defective castings. We no longer would have the junctions between gates and castings, which frequently are defective spots. We no longer would have a long surface of sand over which the metal rushes, and, therefore, presents an opportunity for washing loose sand in the mold cavity. We no longer would have points in the casting where the metal entered last which are hotter than other surrounding parts.

We must provide a means of entrance for the metal and, therefore, we must do it with the thought that it must be as perfect as possible so that any possible complication of the casting itself will not arise from these gates. Once a proper gate has been established, the foundryman will do well to continue to duplicate that gate exactly in the production of all further castings from the same pattern.

Too many foundrymen are inclined to change the gate the minute they find a defective casting, without realizing that the gate has been producing good castings in the past and should continue to do so if the cause for the defects were to be uncovered and corrected.

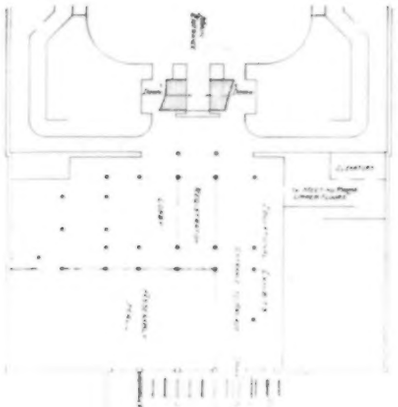
It will be noted that a good deal of emphasis has been put upon the maintenance of the proper size sprue to insure its being kept full during the entire pouring period. It is advisable for several reasons to have restrictions somewhere in the runner or at base of the sprue to insure keeping the sprue completely filled. First and most important it prevents suction of air into the mold with the metal which tends to form slag and scum spots.

Second, such sections may tear the sand loose as the air becomes heated and expanded, and thus carry loose sand into the casting. Third, and by no means an unimportant factor, keeping the sprue filled does not require an expert in pouring. Any one with good eyesight and a steady hand quickly can be taught to pour molds correctly. Since all molds are poured in this way, errors in pouring are eliminated and causes for defects thereby are reduced.

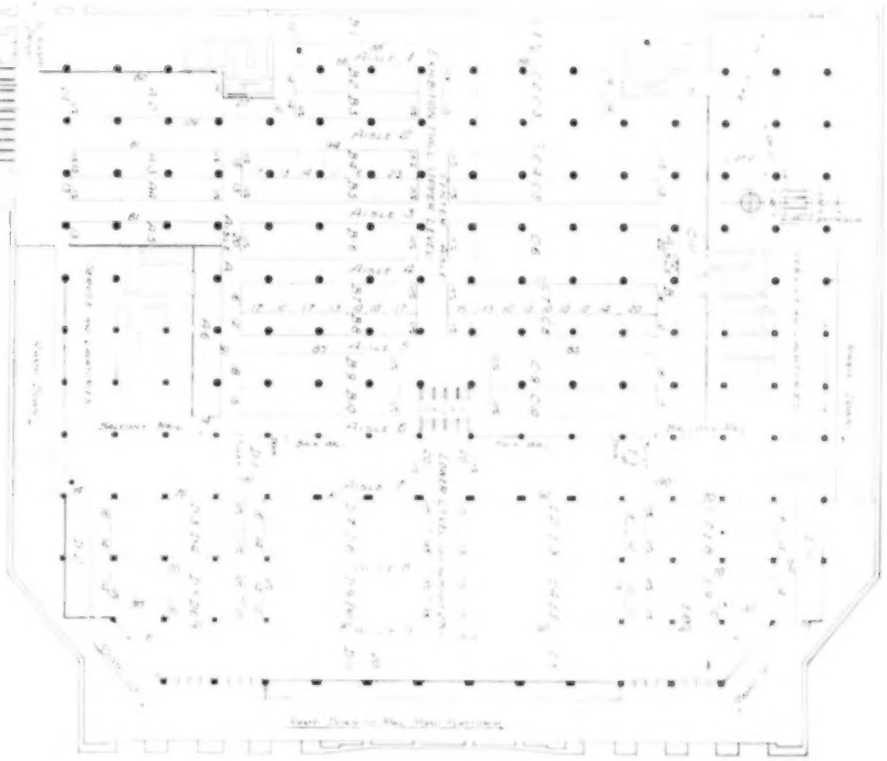
When the time comes to study the cause for some certain defects, the question of how the mold was poured no longer has to be considered. Since it is simply a question of keeping the sprue filled throughout the entire pouring period, the molder does not have to stop molding to pour off his own molds. He can go on molding, while unskilled labor is pouring.

In the opinion of many foundrymen that is the only work the molder should be allowed to do. The sprues should be reamed out so that the pourer has no trouble in striking the sprue with the stream. Otherwise, spilling will occur, with a consequent spattering and loss of expensive metal.

Where a pouring basin is used, the size of the basin should be considered carefully so that a bath of metal will be maintained large enough to keep the sprue or sprues filled at all times. An ample layer of molten metal should be maintained (*Please turn to page* 82)



See Record Breaking Foundry Show At Cleveland in May



RESPONSE to the first bulletin on the exhibition of foundry equipment and supplies, to be held in Cleveland May 14 to 19, in connection with the annual convention of the American Foundrymen's association, has been exceptionally gratifying. With practically 200 exhibitors assured by the middle of December, C. E. Hoyt, executive vice president of the association and manager of exhibits, has predicted there is fair prospect not only of exceeding the 251 exhibitors in Cleveland in 1930, but the all-time record of 267, established at the international foundry show in Detroit in 1926.

Late last month the association mailed space nomination blanks to all the companies which have indicated their intentions of exhibiting at the Cleveland show. Floor plans of the main entrance, the arcade and the upper and lower exhibition hall levels, are shown at the top of this page. According to the general plan, the major operating exhibits will be allocated to the lower level of exhibition hall, in the *D* and *E* blocks; the lighter operating exhibits will be in *C* blocks on the upper level; and non-operating exhibits will be in the *A* and *B* blocks, with the arcade used exclusively for non-operating exhibits, with the exception of operating models. Entrance to registration headquarters will be on Lakeside avenue, through the main lobby of the auditorium and down the stairway to the lower level.

All departments of the national association as well as other groups responsible for various phases of convention and exhibition activities, are moving forward with plans for the 1938 gathering of foundrymen. Technical Secretary Robert E. Kennedy, and assistant Technical Secretary Norman F. Hindle, report considerable progress in selection of papers to be presented at Cleveland. A tentative program of technical features will be available shortly.

Bertram G. Parker, president, Youngstown Foundry & Machine Co., Youngstown, O., and chairman of the Northeastern Ohio chapter of the A.F.A. is completing appointment of convention committees from membership of that chapter. Special features are being planned for the ladies attending the convention, and an unusual stag night program is promised.

For the benefit of all foundrymen in northeastern Ohio and adjacent territory, the exhibition will open on Saturday, May 14. A special committee of the Northeastern Ohio chapter has been appointed to handle the distribution of (*Please turn to page* 86)

QUESTIONS and ANSWERS

This department includes problems relating to metallurgical, melting and molding practice encountered in making castings. Questions from subscribers addressed to the Editor of The Foundry will be answered by members of the editorial staff, supplemented where occasion requires by the advisory staff.

Suggests Suitable Composition For Aluminum Burner Tops

We made some aluminum burner tops for gas stoves, but they have not been satisfactory, since they become discolored in service. We have seen quite a number of American stoves with aluminum burners. Can you tell us how the manufacturers get over this trouble?

According to an authority on this subject, there is only one aluminum alloy satisfactorily fulfilling the requirements of gas stove burners. In fact the alloy was developed for this particular application. The alloy contains approximately 5 per cent nickel, the remainder aluminum. This alloy was designed principally for die casting work and therefore most of the American burners are made by this process. The sand casting characteristics are not very good, although there have been a few cases where it has been used for sand cast parts.

Experiences Trouble Dropping The Cupola Bottom

We operate a 30-inch inside diameter cupola, equipped with six 2 x 9-inch tuyeres, and 12 feet from the tuyeres to the charging door. The usual heat is 8000 pounds, divided into 10 charges, each charge made up of 640 pounds of gates and machine scrap, 160 pounds of pig iron and 115 pounds of coke, with 500 pounds of coke on the bed and 250 pounds of lime rock distributed between charges. Time of heat 1 hour and 40 minutes. Blower supplies 1500 cubic feet of air per minute. A trough at the back of the cupola catches most of the slag wool, but the slag hole closes frequently during the heat. The cupola is choked at the end of the heat and does not drop freely. We shall appreciate comment on the various features.

Since the cupola does not drop clean at the end of the heat, it is reasonable to assume that a bridge has formed on the inside. This theory further is supported by the statement that an hour and 40 minutes are required to melt 8000 pounds of iron. Under favorable conditions a 30-inch diameter cupola should melt nearly 12,000 pounds in that time. The bridge on the inside cuts down the effective melting area. Formation of this bridge may be due to one or a combination of several factors, including high blast pressure, insufficient limestone and low quality coke.

Your blast volume is not excessive, in fact it is about correct for melting 3 tons per hour, but we are inclined to the opinion that it is driven in too rapidly through the narrow tuyeres. On a small cupola, experience has shown that the best results are secured with a ratio of 1 part tuyere area to 4 parts cupola area. With six tuyeres 2 x 9 inches, a total of 108 inches, and a cupola area of slightly over 700 square inches, your present ratio is approximately 1 to 7. We suggest the insertion of a new set of tuyeres 4 x 10 inches. Present tuyeres also may be responsible for the slag hole freezing. If a change in the size of the tuyeres does not clear up the trouble, lower the slag hole an inch or two.

Has Difficulty in Casting of Gate Valve Bodies

We are experiencing difficulty in the casting of gate valve bodies. Our trouble is a roughness inside caused by the metal cutting into the core. We have tried treating the cores with a black lead bath, and also have tried using a mica core wash. This has not eliminated that condition. We make our cores of a linseed oil sand, using a small amount of new sand. We are blowing these on a core blowing machine. When cast, some castings have a clean surface, and some are rough where the metal cuts into them. What is the general practice in making these cores? Are they made by machine or hand? Also, what type core mixtures are used?

You do not state what alloy you use for the cast-

ing of the gate valve bodies, but we assume it is one of the standard alloys used for this purpose by the valve manufacturers. The production of cores for these from oil sand core materials is quite the usual practice and blowing them on a machine is quite commonly the practice in the industry. The size of the sand used will, of course, affect the tendency to be cut or burnt into by the hot metal and the amount of binder used is an important factor.

The less binder, the less material there is in a core which may be affected by the hot metal, if the sand itself is clean and capable to withstand high temperatures without melting or reacting with the molten metal. Most cores of this kind are made from a new silica sand, which is absolutely free from any loam or vegetable or animal matter so as to avoid just such trouble as you are experiencing; and the size of the particles is arrived at by experiment for the work in hand.

The amount of core oil is a minimum and the amount of water is only just that which will distribute the oil throughout the sand thoroughly, and the drying should be done so that the water and other volatile material driven off by the drying process passes off quietly and freely without opening up large pores in the cores. The cores are dipped into or washed in a graphite solution of a creamy consistency, care being taken not to fill the vents.

The graphite core wash is commonly made up of the best grades of graphite with some fire clay or other bonding material and water. It should be well dried and if it is impossible to avoid having the metal forcibly strike some particular spot in the core, that particular spot should be protected carefully by having it rubbed by hand with a graphite paste.

If these suggestions are followed, you should have little or no trouble from your cores. However, the burning of these cores may be caused by the method of gating the castings. Your gates may cause the heated metal to strike the cores with such force as to forcibly erode the surface covering of the core and thus open up the core for easy burning by the molten metal during the time the casting is setting. You may find that some of the castings on a gate never give you any trouble and others are common offenders.

If this is the case, obviously the gating is responsible. We believe that you can correct your difficulty by studying the gating carefully and determining whether the gates might not be improved by adding another gate to each of the castings; or by definitely changing the location or direction of the present gates so that the force of the entering stream of metal cannot harm the core.

The temperature at which the metal is poured influences the amount of burning that may occur; consequently the pouring of the metal at too high a temperature should be avoided. You may find upon examination of your present practice that the castings poured first from the heat which are poured at the hottest temperature are invariable those which are giving you the most trouble. This would indicate that your pouring temperature is rather higher than necessary.

Possibly you were attempting to pour at the higher temperature in order to cast a large number of molds from a pot of metal. You might find it to your advantage to pour a smaller number of molds per heat and thus enable yourself to pour all of them at a closer approximation to the ideal temperature. Obviously, those poured first may be poured a little hot, just as those poured last may be poured a few degrees too cold. Certainly a reduction in defectives makes a saving that will compensate for any additional cost due to pouring in smaller heats.

Summing up, your core practice is good, but care should be taken that the pores of the cores are protected by a graphite coating. The pouring temperature should be carefully watched; the gating should be changed if necessary to avoid forcible erosion by the inrushing stream of heated metal. Frequently the gating can be changed so that the metal will enter so quietly that there is no jet effect that tends to erode or destroy the previously well prepared surface of the core or mold.

Can Increase Heat Resistance Of Stoker Parts

We have several customers who are using automatic stokers on 200 horsepower boilers carrying 100 pounds per square inch feed pressure, and employing coal with a fusing point of approximately 2850 degrees Fahr., and are desirous of finding out if there is any alloyed metal which will give a higher heat resistance than the regular gray iron casting under forced draft. Our present mixture is comprised of 40 per cent pig iron; 25 per cent steel; and 35 per cent cast iron scrap which results in a metal containing about 1.95 per cent silicon.

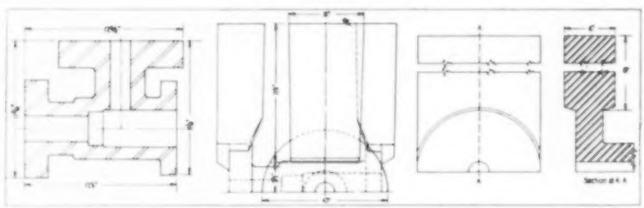
You can obtain much better results from your stoker parts by making a change in the silicon content of your present mixture, and in addition incorporating about 1.5 per cent nickel and 0.60 per cent chromium. A suggested composition of your stoker parts will contain 1.50 per cent silicon, 0.60 per cent manganese, 0.60 per cent chromium, 1.50 per cent nickel, and 3.30 per cent carbon.

To obtain the desired silicon content using the same pig iron as at present, it will be necessary to reduce the pig iron from your present 40 per cent to 30 per cent and increase the steel scrap from 25 per cent to 35 per cent; leaving the cast iron scrap at 35 per cent. However, due to the high silicon content of the pig iron, we believe that it would be more advisable to purchase pig iron containing a lower silicon content say about 2.25 per cent for the mixture. With 40 per cent of the new pig iron, 25 per cent steel scrap and 35 per cent cast iron scrap, the final iron at the spout would contain approximately 1.50 per cent silicon. Additions of chromium and nickel may be made through use of ferrochromium and pig nickel or nickel shot, or through the use of a nickel-chromium bearing pig iron. However, in the latter case some further additions of chromium and nickel may be required.

Large Riser Needed On Steel Casting

We are enclosing blueprint of a steel needle valve casting, one of several types which we manufacture and on which we have had considerable trouble with shrinkage defects. Recently we have adopted the type of riser shown at the right. This has cured the shrinkage trouble, but has increased the cost of cleaning the castings. Can you suggest a solution for this problem.

Large risers on steel castings, particularly those which have to be perfectly solid, are a necessary evil for which no person up to the present has found a satisfactory substitute. In addition to the extra amount of metal required to pour the casting, the subsequent removal of the large risers entail further expense. In your particular case we suggest the type of riser shown at the right in the accompanying sketch as preferable to the riser at present employed and shown in the center in the sketch submitted. As a feeder the second type of head has no advantage over the first, but it presents less difficulty in removal.



Type of riser shown on the right is suggested as preferable to one in the center sketch

Holes Result From Burned Metal

We are forwarding for your inspection a gray iron plunger casting 10 inches in length, 3½ inches diameter at large end and tapering 1 inch at small end. When the casting is machined a great many small holes appear on the surface. The iron is melted in a small cupola 18 inches inside diameter and is charged in 175-pound lots containing 50 pounds pig iron, 65 pounds return scrap and 60 pounds steel rails. Record of an average heat shows 2450 pounds of iron melted with 400 pounds coke. Analysis of the casting submitted shows: Silicon, 1.30 per cent; sulphur, 0.08 per cent; phosphorus, 0.17 per cent; manganese, 0.94 per cent; total carbon, 3.28 per cent, and graphitic carbon, 2.60 per cent. We have observed every precaution with which we are familiar in molding the castings and in melting the iron, but cannot seem to prevent the pock marks in the castings. We have tried molding them two in a flask and one in a flask. We shall appreciate your opinion on the cause of and remedy for this form of defect.

Your change from two to one casting in a flask indicates that you suspected the presence of gas or steam usually developed in abnormal quantity in the sand separating two deep castings. The remedy for that is to provide a free exit for the steam either through an open grain sand, or by use of a vent wire. However, in the casting submitted the holes are of a character which indicates they were in the metal when it entered the mold. Your further statement that nearly all the castings show the same form of defect would seem to indicate that your cupola practice is at fault.

Of course other factors may be present with which we are not familiar, but basing an opinion on the evidence submitted we should say that you are using an excessive blast, insufficient coke and melting the metal too cold. The high blast oxidizes some of the metal and produces gas inclusions. Exceedingly hot metal will allow all or nearly all the gas to escape, but sluggish metal will hold the bubbles in captivity. The obvious remedy is to manipulate your melting practice to a point that will produce sizzling hot iron.

It need not necessarily be poured at this maximum temperature, but it should be melted hot. Scrap and pig iron should be broken into small pieces for use in a cupola 18 inches inside diameter. This is particularly true of the steel rails. The average section is too large to be used in a small cupola. Other and lighter forms of steel scrap are more suitable. Off hand, and without any other information except that you melt 2450 pounds of iron with 400 pounds of coke, we are inclined to the opinion that your bed is too low.

Bridge Develops During Heat

At the close of a 5-hour melting period, our cupola lined to 44 inches is bridged so badly that we have to break the bridge through the tuyeres before the bottom can be dropped. The iron charge, 1500 pounds, is made up of pig 35 per cent, cast iron scrap 60 per cent and steel scrap 5 per cent. The coke bed is maintained at a height of 38 inches above the tuyeres and a coke ratio of 1 to 7 gives very hot iron with a blast pressure of 7 ounces per square inch. For a flux we use 45 pounds limestone per charge. No drop in temperature is noted between the first and last iron. The tuyere, 4 inches high is continuous except where it is blocked off in the vicinity of the slag hole.

The fact that you produce very hot iron for a continuous period of 5 hours from a 44-inch diameter cupola indicates that little room is left for improvement. On a shorter heat the bridge to which you refer would not develop to an extent that would cause any trouble. However, the fact that a bridge does develop and increases to an embarrassing extent over a 5-hour period, would seem to indicate that the slagging feature is not quite perfect. In ordinary practice and for shorter heats, your proportions of iron, coke, limestone and air conform to accepted standards.

For long heats the relative proportions must be modified to some extent. The splits of coke must be kept closer together to prevent the slight lapse in steady descent which promotes the formation of a bridge. A few experimental changes should enable you to hit upon the ideal combination. To begin, we suggest reducing the iron charge to 1000 pounds with a corresponding reduction in the coke between the charges. It may be that your limestone is not of the proper grade for satisfactory operation.

Dryers Are Cleaned In Potash Bath

Heretofore our core dryers have been cleaned with a combination of hand scraping and flexible grinders in the pattern shop. This is an expensive process. Recently we have tried to clean them in a potash bath, but without success. We shall appreciate your opinion on the most economical method. We have no sandblast.

The usual method for cleaning core dryers, that is to remove the gummy material adhering to the inside surface, is to soak them in a potash bath. The strength of the bath and the time required, naturally will vary to some extent depending on the depth of accumulation. Possibly you overlooked the important feature that the water must be hot. We suggest you try again. Adopt some method for keeping the water hot, increase the strength of the solution and leave the dryers in the bath for a longer period. Over a period of time you can vary these three factors until you arrive at the ideal temperature, strength and time.

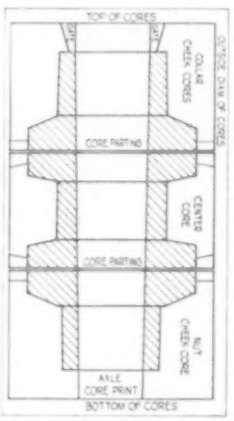
Blow Holes Show in Machined Hubs

We are having trouble with porous hubs on wheels in which the spokes and rim are steel and the hub is cast iron. A set of cores is assembled to form the hub mold and the wheel is set up on a stand. After each hub is cast and has cooled sufficiently, the wheel is removed from the stand and the process is repeated. Analysis of the iron shows: Silicon 2.04 per cent, sulphur 0.098 per cent, phosphorus 0.28 per cent, manganese 0.67 per cent. We pour most of the castings with iron that is not very hot. The iron leaves the cupola very hot, but our general rule for pouring temperature is fairly hot for light hubs, medium hot iron for medium size hubs and cold iron for heavy hubs. These hubs range in weight from 3 to 50 pounds. However the hubs on some wheels weigh 100 pounds or more. We make all sizes in the same heat and therefore have to compromise on a general purpose iron. We cool the iron as much as possible because hot iron burns into the mold and we cannot clean the hubs. Hot iron also leaks out around the spokes and in addition seems to be the cause of shrink holes and other defects.

Apparently there is nothing wrong either with your iron or your method of melting it. The blow holes are caused by gas evolved from scale on the ends of the steel spokes. This can be prevented by cleaning the ends thoroughly and—as an added precaution—by coating the ends of the spokes with any material that will prevent the surface from oxidizing. Usually all that is required is to grind or sandblast the ends and then dip them into a bath of oil, gasoline, shellac, red lead or water glass.

Where an exceptionally tight grip or union is specified, the ends of the spokes are tinned. Temperature of the metal is not a factor in the development or non-development of blowholes. However, it is pertinent to point out that where a certain amount of gas is produced, it has a much better chance to escape where the metal is hot and liquid, than where it is cold and sluggish. Usually it is advisable to place a riser on a casting of this kind and flow a small quantity of metal through it. In general it may be claimed that hot metal is preferable to cold metal for nearly all castings.

Your claim that hot metal produces more shrink holes than cold metal is explained by the fact that a certain amount of gas is produced in the mold. This gas eventually works out of the hot metal and leaves what appears to be a shrinkage void. The remedy for this is to provide a feeder on the hub and—in some instances—feed the hub with a rod and a little hot metal. In other instances it may be sufficient to flow a little metal through the riser or to pour the casting slowly and touch it up once or twice after the mold is apparently filled. As for the metal burning the core and producing a rough face on the casting, this can be prevented by blacking



Blow holes in hubs are caused by scale on ends of steel spokes

the surface of the cores. Leakage of iron around the spokes may be prevented by small worms of dough, putty, clay, or thick paste.

Daubing for Iron or Steel Ladles

Can you suggest a good daubing mixture for bull ladles employed in pouring iron and steel? Proprietary lining materials are available through several manufacturers.

In one prominent automobile foundry where iron is poured continuously the bull ladles are lined with a mixture made up of 2 parts pulverized fire brick bats, 2 parts old molding sand and 1 part fire clay. This mixture is slightly moistened with water and prepared in a muller in a room set apart for the purpose on the ground floor between two batteries of cupolas. The ladles are brought in on lift trucks. The old linings are knocked out and the new material is rammed against the bottom and side walls to a thickness of about 2 inches.

The mixture is built up against the wall by hand and then rammed quite hard with a piece of 2 x 2-inch stick about 2 feet in length. The result is a smooth, hard lining which remains in constant service for approximately a week. The newly lined ladles are lifted by truck or chain block and placed upon a roller conveyor where the lining is dried by an oil torch. Ganister is the material usually employed for lining steel ladles, but fairly satisfactory lining material can be prepared from various combinations of new and old silica sand, pulverized firebrick bats and fire clay.

Composition Eats Into the Core

We are forwarding blueprint of a bronze casting with points indicated where the cored surface is very rough. Metal is of the following composition: Copper 80 per cent, tin 10 per cent, lead 10 per cent and phosphorous 0.04 per cent.

On the blueprint which accompanied your inquiry we note that all the offending areas are in corners, that is where the metal presses the sand from two sides. This condition imposes severe service on these areas of the core. In this particular instance the severity is accentuated by the fact that the metal in the casting on account of the lead and phosphorus content—to use the usual foundry term—*eats into* the sand to a greater extent than other compositions. However, with an otherwise satisfactory core, this *eating in* at the corners may be prevented by a good coat of silica wash similar to that used in steel foundries. The cores should be made from a good grade of sharp sand bonded with a minimum amount of oil and well vented. They should be dried almost to the burning point. In the mold a clear vent should be provided at each and every print so that the vent can escape as rapidly as possible.

Temperature for Baking Molds

Can you tell us at what temperature molds should be baked for making 20 per cent nickel bronze castings? Is there any book published on this subject?

Broadly speaking any temperature over 212 degrees Fahr.—a temperature sufficiently high to evaporate water—will dry the molds satisfactorily. This applies to molds made from naturally bonded sand. Where other binding agents are employed, the temperature may vary to some extent above this point depending on the character of the material. For example cereal and sugar binders require a temperature of approximately 350 degrees to develop full strength.

Oil binders require a temperature between 350 and 400 degrees. However, the temperature may be raised considerably above these ranges without any adverse effect. Since time usually is an important element in foundry operation, the ovens usually are operated at a temperature above the minimum requirement. Papers dealing with oven temperatures have been presented frequently in the pages of THE FOUNDRY. We do not know of any book on the subject.

H. P. Hammond

Clyde L. Frear

George B. Waterhouse

W. P. Laytham

MEN of INDUSTRY

WILLIAM P. LAYTHAM, newly elected president of the New Jersey Foundrymen's association, has long been identified prominently with the industry in the East as head of the William P. Laytham & Sons Inc., Paterson, N. J. Born in Jersey City, N. J., in 1872, he began his foundry career in his youth as an apprentice at the Hay Foundry Co., Newark, N. J., where his father was superintendent. Then, in 1887, he became identified with his father in the establishment of the Eagle Iron & Brass Foundry, Passaic, N. J., a concern which flourished with the great industrial development of the Metropolitan area of Northern New Jersey. After the death of his father, Mr. Laytham assumed active management of the company and in 1919 purchased the business in its entirety. Due to pressure for additional capacity, he purchased the Gillespie-Eden foundry in Paterson in 1924, merging the two companies under the present name, with his two sons, A. W. and W. B. Laytham. An extensive building program at Paterson was made necessary by the consolidation. Being a thorough exponent of the mechanized foundry, Mr. Laytham has his plant equipped with extensive sand handling and conveyor machinery. The foundry produces gray iron and aluminum castings and is equipped with machine and pattern shops. It is regarded as being one of the best production foundries in the eastern states.

• • •

DR. H. P. HAMMOND, head of the department of civil engineering, Polytechnic Institute of Brooklyn, since 1927, now is dean of the school of engineering Pennsylvania State college, State College, Pa. Dr. Hammond began his teaching career as an instructor in civil engineering at the University of Pennsylvania, accepting a similar position at Lehigh university two years later. He joined the staff of the Polytechnic Institute of Brooklyn in 1912, remaining there 25 years. Dr. Hammond represents the Society for the Promotion of Engineering Education on the Engineers Council for Professional Development and is a member of the council's committee on engineering schools.

• • •

DR. GEORGE B. WATERHOUSE, professor of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass., was elected president of the American Society for Metals at its nineteenth annual national metal congress and exposition. Dr. Waterhouse was born in Sheffield, England, in 1883. He was graduated from the University of Sheffield in 1901 and received his doctor of philosophy degree from Columbia university, New York, in 1907. Dr. Waterhouse was connected with the Lackawanna Steel Co., now a part of the Bethlehem Steel Corp., as metallographist, metallurgist and metallurgical and inspecting engineer until 1922 when he became a professor at Massachusetts Institute of Technology. He is a member of the American Iron and Steel institute, the American Institute of Mining and Metallurgical Engineers, the American Society for Testing Materials, the Iron and Steel Institute of Great Britain, the American Society for Metals, and other technical bodies.

• • •

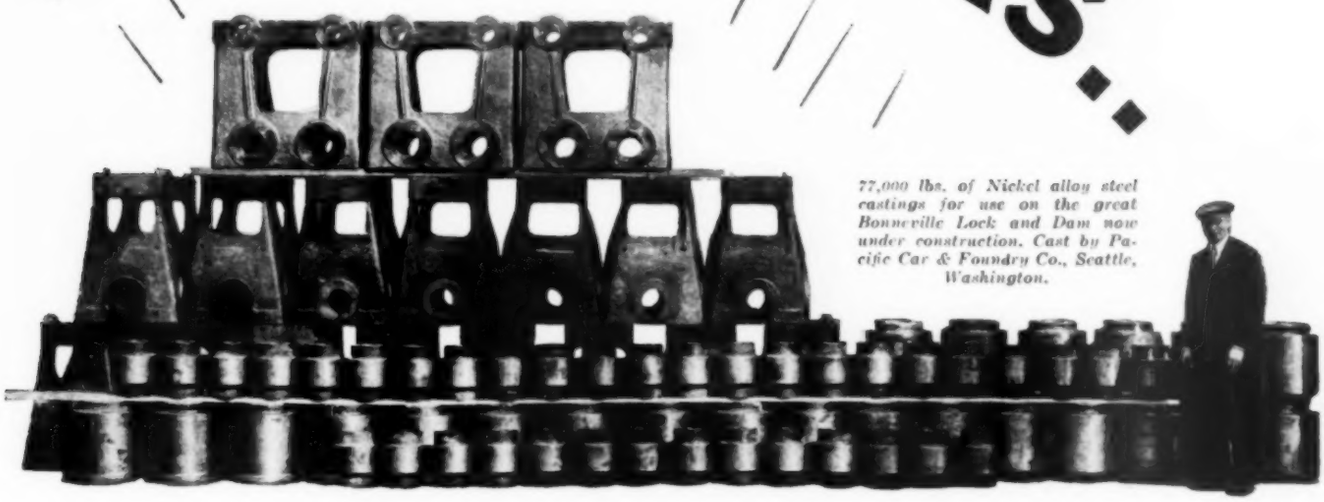
CLYDE L. FREAR, for the past 2 years metallurgical engineer, Kelsey Hays Wheel Co., foundry division, Detroit, has been made metallurgical engineer, Pitcairn Co., Pittsburgh Valve & Fittings division, Barberton, O. For 3 years following the war Mr. Frear was assistant professor of materials and metals at the United States Naval academy, post graduate school, Annapolis, Md. Later he was employed as chief metallurgist, De Laval Separator Co., Poughkeepsie, N. Y.

• • •

SAMUEL E. BOOL, partner of Pickands, Mather & Co., Cleveland, was honored by his associates recently on the fiftieth anniversary of his joining the company. Letters and telegrams from friends and business associates from many parts of the country and large baskets of flowers greeted him on arrival at his

(*Continued on page 44*)

PILE UP ORDERS...



77,000 lbs. of Nickel alloy steel castings for use on the great Bonneville Lock and Dam now under construction. Cast by Pacific Car & Foundry Co., Seattle, Washington.

...*for* NICKEL STEEL CASTINGS

Vapor Channel casting for refinery. Manufactured from Nickel-chromium steel by Beaumont Iron Works Co., Beaumont, Texas.

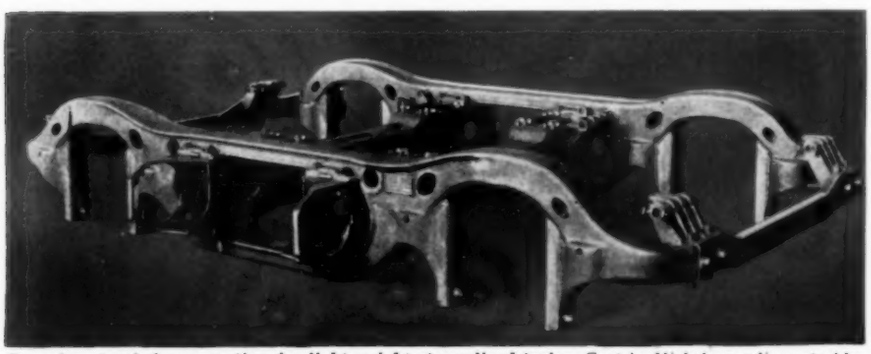
The exacting requirements of modern industry are creating a demand for these alloys

● The superior mechanical properties of Nickel alloy steels are aiding materially in meeting the demands for high quality castings used in light weight as well as in general designs.

Railroads today, are specifying materials of construction which are capable of providing the high strength, improved toughness and ductility required in light-weight designs intended to cut down dead weight of rolling stock. Petroleum producers and refiners seek equipment that will withstand high and low temperatures accompanied by constantly increasing working pressures. Big public work projects call for durable and dependable materials throughout.

All of these exacting requirements are being met with castings of Nickel alloy steel. The excellent service records compiled from many installations offer eloquent testimony of their dependability. The ever increasing demands for Nickel steel castings is evidence of their acceptance by industry.

The cast Nickel steels possess greater strength, resistance to wear, shock and fatigue and stand up under varying temperature and pressure conditions. An important feature is their high strength-weight ratio making them ideally suited for castings employed in light-weight designs. Consultation on the use of Nickel in steel castings is invited.



One piece truck frame casting for light-weight streamlined trains. Cast in Nickel-vanadium steel by Locomotive Finished Materials Co., Atchison, Kansas.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL ST., NEW YORK, N. Y.

(*Continued from page* 42)

office. The company's entire staff gathered to congratulate him. Henry G. Dalton, senior partner, who hired Mr. Bool as a clerk Dec. 15, 1887, made a brief speech. Mr. Bool, a lover of horses, was presented a bronze figure of a mare and colt by the office force.

♦ ♦ ♦

L. O. HOFSTETTER recently established his own laboratory for general foundry consulting work at Vernon station, Los Angeles.

♦ ♦ ♦

ERNEST P. WAUD has been elected president of Griffin Wheel Co., Chicago, succeeding FRANK L. WHITCOMB who has been elected vice chairman of the board of directors.

♦ ♦ ♦

STANLEY M. HUNTER has been appointed manager of sales, American Hoist & Derrick Co., St. Paul. Mr. Hunter has been associated with that organization for the past 2 years.

♦ ♦ ♦

H. J. GEORGEN has become connected with the sales staff of Michiana Products Corp., Michigan City, Ind., with headquarters at 80 East Jackson boulevard, Chicago. Mr. Georgen has had 15 years experience in the production and sale of the special cast alloys.

♦ ♦ ♦

DANA D. BARNUM recently was reelected president, American Standards association. EDMUND A. PRENTIS, Spencer, White & Prentis, New York, was elected vice president; F. M. FARMER, Electrical Testing Laboratories, New York, was made chairman, Standards council; and R. P. ANDERSON, American Petroleum institute, New York, was made vice chairman.

♦ ♦ ♦

ARTHUR N. GOFF, 94 Eighth street, Fond du Lac, Wis., has been appointed representative of the Roots-Connersville Blower Corp., and will handle the sale of turbine pumps in Wisconsin, with the exception of the Milwaukee area. F. W. BARTLING and G. T. OBERKLEIN, 950 East Court street, Cincinnati, will cover the southwestern section of Ohio, several counties in north central Kentucky, as far south as Lexington, and a few counties in Indiana.

♦ ♦ ♦

DR. PAUL DYER MERICA, director of research of the International Nickel Co., New York, and vice president of the International Nickel Co. of Canada, has been awarded the 1938 John Fritz gold medal, highest of American engineering honors, for "important contributions to the development of alloys for industrial uses." The award is made annually for notable scientific or industrial achievement by a board composed of representatives of the four national engineering societies of civil, mining and metallurgical, mechanical and electrical engineers.

Dr. Merica was born in Warsaw, Ind. in March, 1889. He studied from 1904 to 1907 at De Pauw university, which in 1934 conferred upon him the degree of doctor of science. In 1909 he received his bachelor of arts degree from the University of Wisconsin and a Ph. D degree from the University of Berlin in 1914. Following 5 years of work as research physicist in the United States bureau of standards,

Dr. Paul Dyer Merica

Dr. Merica became director of research of the International Nickel Co. He is a member of many technical associations and is the author of many articles and monographs in scientific and technical publications.

♦ ♦ ♦

DR. FRANCIS C. FRARY, director of research, Aluminum Research laboratories, Aluminum Co. of America, Pittsburgh, has been presented the Pittsburgh award for 1937 by the Pittsburgh section of the American Chemical society. Through achievements in the metallurgy of aluminum, Dr. Frary has helped Pittsburgh to establish an international reputation for research in metals.

♦ ♦ ♦

A. E. FISHER, formerly foundry superintendent, Ebco Mfg. Co., Columbus, O., recently has been appointed foundry superintendent Miller Foundry Co., Columbus. Mr. Fisher was employed for 7 years with the Schill Co., Crestline, O., beginning in 1909 and from there he went to the Hertenstein Co., Columbus, where he remained for 19 years. During the past 2 years he has been foundry superintendent of the Ebco Co.

♦ ♦ ♦

FRANK L. NEWARD, 608 Marquette building, Detroit, has been appointed representative in Michigan of the Gehnrich Corp., Long Island City, N. Y., specializing in industrial oven and dryer equipment.

♦ ♦ ♦

JAMES L. WICK JR., president, Falcon Bronze Co., Youngstown, has been elected a director of the industrial division, Youngstown chamber of commerce.

♦ ♦ ♦

GEORGE A. SEYLER, vice president and general manager, Lunkenheimer Co., Cincinnati, was re-elected president of the Industrial Association of Cincinnati at its annual meeting held recently.

♦ ♦ ♦

EDWARD A. JOHNSTON, vice president, International Harvester Co., Chicago, has been awarded the Cyrus Hall McCormick medal for "exceptional and meritorious engineering achievement in agriculture" by the American Society of Agricultural Engineers.

♦ ♦ ♦

DR. ROBERT F. MEHL, director of the metals research laboratory, Carnegie Institute of Technology, Pittsburgh, has been elected chairman, Institute of Metals, American Institute of Mining and Metallurgical Engineers. For several years Dr. Mehl was chairman of the papers and publications committee of that organization.

♦ ♦ ♦

ALDEN P. CHESTER, vice president, Globe American Corp., Kokomo, Ind., was named president of the Institute of Cooking and Heating Appliance Manufacturers at its fifth annual convention in Cincinnati recently. C. ACERKSON, vice president, Agricola Furnace Co., Gadsden, Ala., was elected vice president, and GARVIN W. BROWN, president, Indianapolis Stove Co., secretary.

♦ ♦ ♦

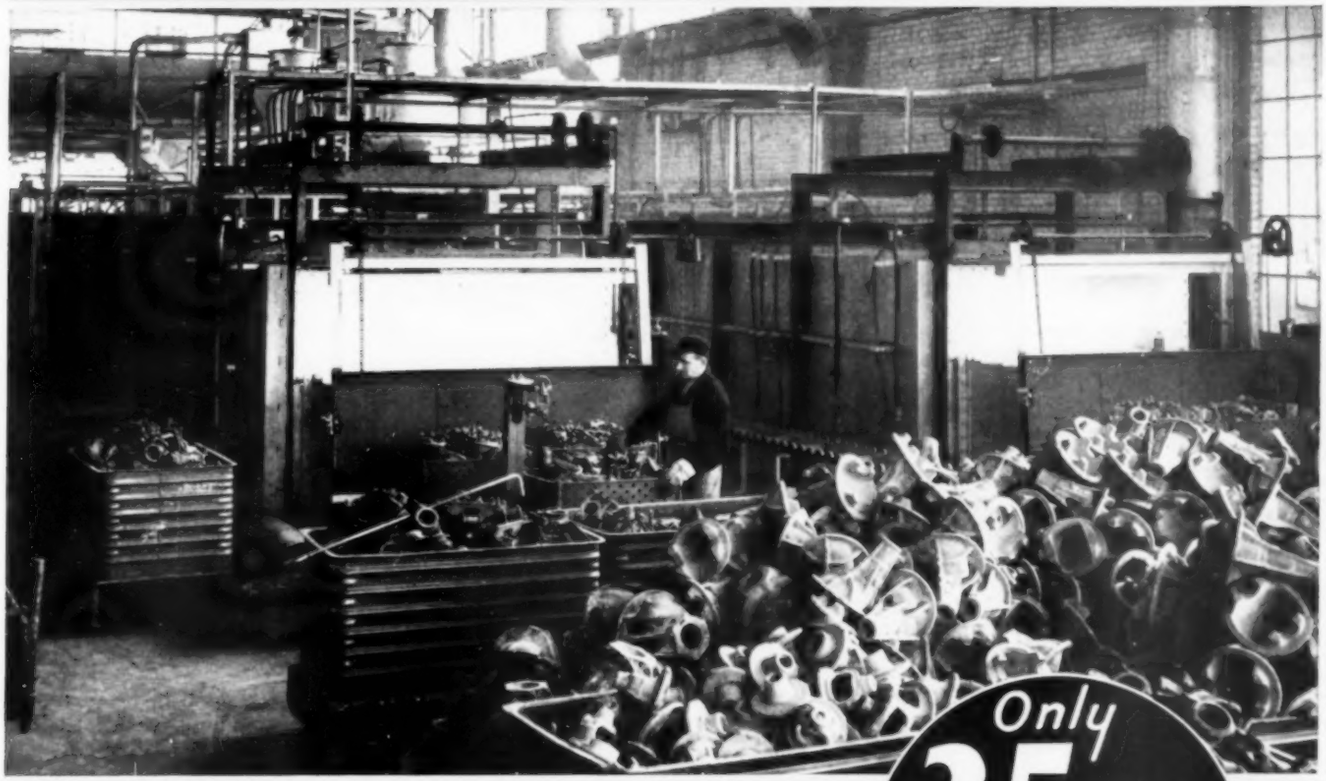
ERNEST P. WAUD has been elected president of the Griffin Wheel Co., Chicago, succeeding Frank L. Whitcomb, who has been elected vice chairman of the board of directors. Mr. Waud became connected with the company in 1905 as an inspector of chilled railroad car wheels and later became chief inspector, department manager and assistant treasurer, and in 1919 was elected a vice president.

♦ ♦ ♦

SAMUEL F. PRYOR JR., vice president of the Southern Wheel division, American Brake Shoe & Foundry Co., has been appointed assistant to the president of that company. Mr. Pryor has been associated with the Southern Wheel Co. division since 1924, when he began service as a molder. He became assistant superintendent of that de-

(*Concluded on page* 46)

Saves 133 Hours! — and eliminates all scale



These Electric Furnaces Anneal Malleable Parts in Only 35 Hours instead of 7 DAYS as formerly

In addition to the tremendous saving in annealing time, these new continuous controlled atmosphere, electric furnaces make possible quicker deliveries, produce more uniformly annealed castings, reduce fuel and labor costs, provide cleaner castings, improve working conditions . . . *and entirely eliminate scale.*

The short-cycle method has revolutionized the malleable process. There is no packing material used . . . the castings are simply loaded into trays and automatically pushed through the furnaces in a special protective atmosphere and are discharged at the other end . . . uniformly annealed *and absolutely scale-free.*

The above is only one of a number of interesting installations we have recently made. We build furnaces for bright annealing, scale-free hardening, carburizing, copper brazing, nitriding, forging, billet heating and every other heating and heat treating process. Further details gladly sent on request.

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production

(*Concluded from page* 44)

partment and entered the sales department in 1927. He was elected vice president in 1930.

• • •

SOUTHARD N. BALDWIN, foundry equipment maintenance engineer, who has been employed by the Soviet Union for the past 8 years as a consulting engineer in the design, rearrangement, fabrication, installation and maintenance of foundry equipment, is returning to the United States shortly. Mr. Baldwin previously was employed by the

Southard N. Baldwin

Ford Motor Co. for 14 years, completing his services there as superintendent of the steel fabricating department of the Highland Park plant. He also was an assistant to the maintenance superintendent of the Fisher Body Corp., Pontiac plant.

Book Review

Effect of Impurities in Copper, by S. L. Archbutt and W. E. Prytherch, fabrikoid, 134 pages, 6 x 9¾ inches, published by the British Non-Ferrous Metals Research association, London, England, and supplied by THE FOUNDRY, Cleveland, and in Europe by the Penton Publishing Co. Ltd., London.

Since the formation of the British Non-Ferrous Metals Research association in 1920, it has carried out investigations on the effect of impurities on the properties of copper. Results of those were made known to its members from time to time, but now all that work has been summarized and reviewed in the light of present knowledge to form a single, valuable book.

It opens with an account of the scope, methods of preparation and testing materials, and information on commercially pure copper. Then follows chapters on the effect of oxygen, hydrogen and sulphur; effect of iron, phosphorus and silicon; effect of bismuth and lead; brittleness in annealed copper; effect of arsenic, antimony, nickel and silver, and combined effect of nickel, antimony and oxygen; combined effect of bismuth, arsenic, antimony, nickel and oxygen, two or more together.

Examination was made by tensile, impact, hardness, fatigue, and bend tests on the mechanical side, and by density and electrical conductivity measurements on the physical side. After a discussion of segregation of impurities, the authors present a chapter in which the comparative effects of various impurities are summarized. Numerous tables, micrographs, and illustrations amplify the text, and the index is arranged so that the reader may find easily any particular reference he desires.

F.E.M.A. To Meet In Cleveland

Annual meeting of the Foundry Equipment Manufacturers' association has been set by the board of directors for Feb. 8 at the Hotel Cleveland, Cleveland, according to a recent announcement of Arthur J. Tuscany, Tuscany, Turner & Associates, and executive secretary and treasurer of the association.

In addition to handling such routine matters as the election of three directors to fill expiring terms, the association will give further consideration to certain enlarged activities recently inaugurated. One is the broadening of its credit interchange work. Another deals with plans to develop an industry directory. In addition, the meeting will give consideration to plans for the new year.

As the new congress will have been in session sufficiently long to at least indicate a direction, consideration will be given to those things which should be undertaken to safeguard and protect the interests of the member companies.

Foundry Costs

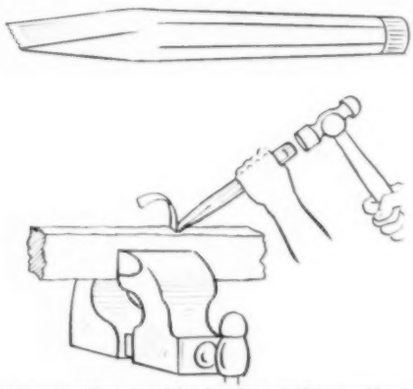
American Foundrymen's association, 222 West Adams street, Chicago, has published a booklet presenting the papers and discussions on foundry costs featured at the Milwaukee convention. The papers include "Simplified Cost System and Foundry Business Record for the Gray Iron Foundry Industry;" "Cost Methods in the Malleable Iron Industry;" "Nonferrous Foundry Cost Methods," by James L. Wick Jr.; and "Proceedings of the Session on Foundry Costs." The booklet may be secured through the association office for $1.00.

McKay Co., York, Pa., recently has placed a new plant in operation for the manufacture of shielded arc welding electrodes.

Chisel Does Work In Half Time

By A. H. Waychoff

On a certain project it was necessary to do a lot of chipping on gray iron castings. In some places the cuts were ½-inch deep. To speed up the job I nicked the edge of the chisel as shown in the accompanying illustration. As a result I found I could cut much deeper and faster and could do a given amount of work in approximately half the



Saw teeth on chisel edge reduces time one half

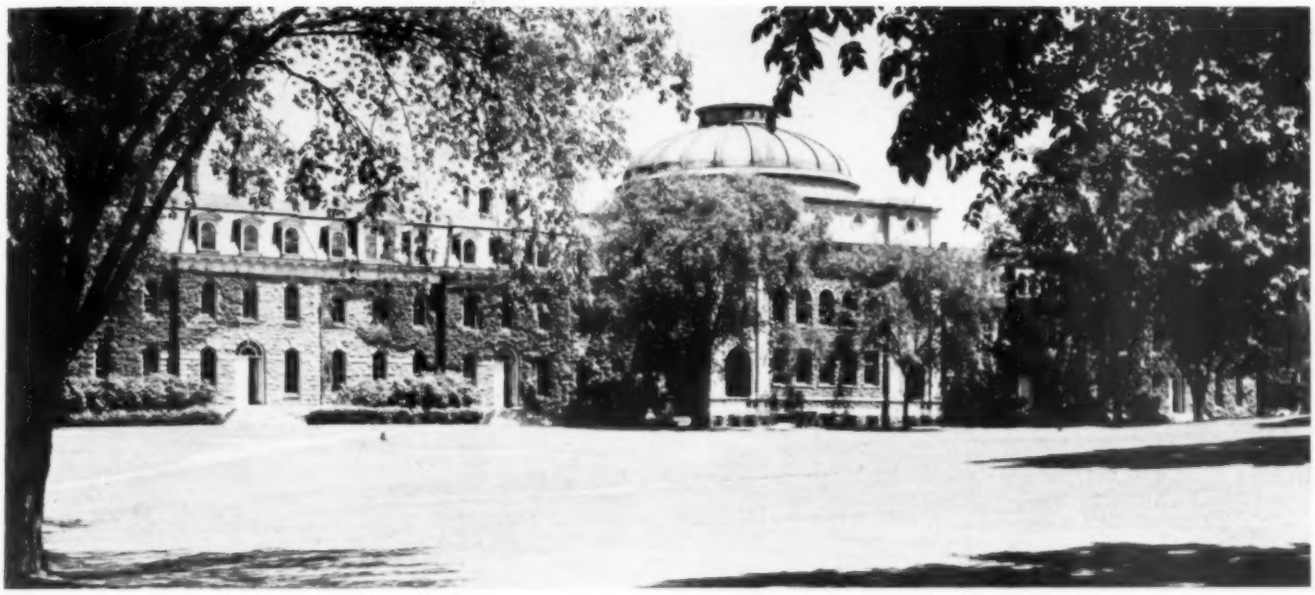
time formerly required. After the chisel was sharpened and before it was tempered a three-corner file was employed to file a number of teeth in the edge.

The chisel then was tempered in the usual manner. Superiority of this type of tool is due to the fact that it is easier to drive the narrow teeth into the metal. They actually cut only a fraction of the material as compared with the usual full width chisel, but the wedging action breaks off the ridges of metal left by the teeth. The finished surface is uniform, even though as a matter of fact more metal is broken than cut off. The teeth plow the way and the parts between the teeth are broken by the force of the blow. In practice I found it easier to take a ¼ or ½-inch cut with this chisel, than it was formerly to take a cut ⅛-inch deep.

Publishes Booklets

The Wirtschaftsgruppe Elektrizitaetsversorgung (Economic Committee of the Electrical Supply Industry), Einemstrasse 1, Berlin, Germany, has published in German three booklets relating to various phases of foundry practice. One contains all the papers presented at the annual meeting held in Berlin, another discusses the fundamental principles of electric heating, while the third describes applications of electric heating.

ADVERTISING PAGES REMOVED



Sibley Hall, one of the imposing group of buildings on the campus of Cornell university, Ithaca, N. Y.

Cornell Conference Features Sand and Metal Problems

SERIES of regional meetings in various sections of the country under the auspices of the American Foundrymen's association and with program and operating detail arranged by the local chapters, culminated for the year 1937 in a meeting at Cornell university, Ithaca, N. Y., Nov. 26 and 27. Designed primarily to cover the northwestern New York area the meeting was sponsored jointly by the A. F. A., the Buffalo chapter of the association and by Cornell university. Organizing committee included Prof. A. C. Davis, Sibley school of mechanical engineering, Cornell university; Henry B. Hanley, foundry manager, American Laundry Machinery Co., Rochester, N. Y.; Robert K. Glass, metallurgical department, Republic Steel Corp., Buffalo; and H. H. Judson, foundry superintendent, Goulds Pumps Inc., Seneca Falls, N. Y. Officers of the Buffalo chapter include: Chairman, T. H. Burke, Otis Elevator Co.; vice chairman, H. W. Pohlman, Pohlman Foundry Co.; treasurer, R. K. Glass, Republic Steel Corp.; secretary, J. R. Wark, E. J. Woodison Co.; and directors Lynn Reynolds, Worthington Pump & Machinery Corp.; A. H. Suckow, Gould Coupler Co.; V. M. Mazurie, Buffalo Foundry & Machine Co.; A. Lockwood, Lumen Bearing Co.; E. R. Starkweather, Titanium Alloy Mfg. Co.; W. S. Miller, Chas. C. Kawin Co.; R. T. Rycroft, Jewell Alloy & Malleable Co.

An unusually interesting and instructive series of papers on the program attracted a registered attendance of 190 with approximately 40 others who attended one or more sessions. The student body of the university was absent on account of the Thanksgiving holiday. The well balanced program included papers on foundry sands, malleable iron, alloy cast iron, steel castings, nonferrous castings and cupola practice. After the conclusion of the formal program on the second day, a demonstration was staged in the laboratories of the university covering materials testing, microscopic examination of cast metals and photo-elastic investigation. With the exception of the laboratory demonstration, the entire program including relaxation periods and entertainment features was staged in Willard Straight hall.

Reads Malleable Paper

Following an address of welcome by S. C. Hollister, Dean, college of engineering, a paper dealing with several features of the malleable iron industry, prepared by the late J. B. Deischer, plant manager Columbia Malleable Castings Corp., Columbia, Pa., was presented by H. B. Hanley, American Laundry Machinery Co., Rochester, N. Y. The speaker, a close personal friend of the author over a period of many years, referred to the sudden and unexpected death of Mr. Deischer a few days before and paid a graceful and touching tribute to his memory.

According to the author of the paper the most recent notable achievement in the malleable foundry industry is the perfection of the so-called short cycle annealing of malleable iron castings. In certain plants the standard annealing time now is 31½ hours while in others a 15-hour annealing cycle has been established. However, this short cycle annealing of malleable iron cannot be done without special equipment. Chemical composition and physical structure of the white iron also are important factors. For example the silicon content must be run as high as possible without causing graphite. The silicon content may be as high as 1.50 or even 1.65 per cent depending on the amount of total carbon present, the type of charge and the cross section thickness of the castings.

The second essential of short cycle annealing involves accurate and sensitive oven temperature control in a specially designed oven with flat roof, indirect heating. Controlled atmosphere permits elimination of annealing pots and packing material, a feature which accounts for approximately 50 per cent of the burden in a pot type oven. In

the 15-hour cycle the charge is raised to a temperature of 1750 degrees Fahr. in 1-hour, held at that temperature for 4 hours, dropped to 1400 degrees in 1-hour and then lowered gradually to 1200 degrees in 9 hours. In the 31½ hour cycle, the first 9 hours are consumed in raising the oven temperature to 1750 degrees. The charge is held at this temperature for 10 hours, then in 2 hours lowered to 1400 degrees and then stepped down slowly over a period of 9½ hours to a temperature of 1200 degrees.

Other Developments Covered

Other developments covered in the paper include the duplexing process where the metal is melted in a cupola and then transferred to the air furnace. Pearlitic cast iron in the author's opinion definitely should be identified by a suitable name and specification to differentiate it from malleable iron. In the ensuing discussion it was pointed out that A.S.T.M. is working on a definite specification for pearlitic iron.

Two papers dealing with foundry sands were presented at a session presided over by Dr. H. Ries, geology department Cornell university and actively connected over a period of many years with all sand work conducted by the American Foundryman's association. The first paper, dealing with mixing and blending foundry sands, was presented by L. B. Knight, Jr., vice president, National Engineering Co., Chicago. He claimed that a survey of many foundries indicated that from 40 to 60 per cent of the scrap loss is attributable to the sand. A large part of this loss could be prevented if the same care and attention is given preparation of sand, as usually is given to metal. Even small foundries may find it profitable to install mechanical equipment for controlling permeability, bond strength, moisture and inert fines.

A number of slides illustrated various types of installation for small and large foundries and reference was made to results obtained in the character of sand, appearance of castings and saving effected in operating cost. The speaker emphasized part played by control and removal of inert fines in controlling permeability. Tests have shown that removal of 2 or 3 per cent of fines from a given sand will result in a larger increase in permeability than addition of 30 per cent new coarse silica sand. Successful sand control, conditioning and reclamation program may be had by the intelligent use of equipment to: 1—Properly clean and screen the sand. 2—Control the amount of fines. 3—Properly prepare the sand in a batch type muller to use a minimum amount of bond and moisture and to obtain maximum uniformity of sand conditions. 4—Aerate the sand after it has been properly conditioned. In the ensuing discussion several points were elaborated by the speaker.

The second paper at this session, "Facing Mixtures for Gray Iron, Malleable, Steel and Nonferrous Castings," was presented by N. J. Dunbeck, Eastern Clay Products Inc., Eifort, O. Departing somewhat from the usual practice in presenting papers on this subject, the author presented a series of actual weights and percentages of materials employed in facings for various weights of castings. For example on green sand facing for steel castings up to 150 pounds, where the sand is reclaimed, he specified 1900 pounds old sand, 25 pounds fire clay, 10 pounds bentonite and 3 pounds cereal. Where a reclamation system is not in use the following mixture is given: 1300 pounds old sand, 700 pounds new sand, 40 pounds fire clay, 15 pounds bentonite and 4 pounds cereal. This will show a moisture content of 4 per cent, permeability 125.

Facing Mixtures Given

Dry sand facing for steel castings up to 8000 pounds contains 1800 parts old sand, 150 parts new sand and 75 parts fire clay. For heavy castings up to 90 tons the facing contains 1900 parts new sand, 190 parts fire clay and 12 parts rosin and shows moisture 5 per cent, permeability 100. The speaker directed attention to the fact that combinations of bentonite, fire clay and cereal are used in all green sand mixtures. Either bentonite or clay may be and are used alone, but the combination seems to retain many of the desirable features of each and to eliminate some of the disadvantages of each. Permeability is not an important factor in dry sand facing. In fact low permeability usually is desirable in heavy work to prevent penetration.

Facing for light gray iron or malleable up to 20 pounds contains 1800 parts old sand, 200 parts bank sand, 80 parts fire clay, 55 parts sea coal. For castings between 20 and 50 pounds the facing contains 1800 parts old sand, 200 parts new sand, 90 parts clay and 84 parts sea coal. Facing for castings in the range between 200 and 1000 pounds is made up of 1800 parts old sand, 300 parts silica sand, 120 parts clay and 110 parts sea coal. For heavy dry sand work the mixture contains 1600 parts old sand, 400 parts silica sand, 120 parts clay and 36 parts pitch. Ordinary sand, high bonded sand or bentonite may be substituted for the fire clay in these mixtures in quantities to give the same strength.

Recommended facing for light nonferrous castings contains 1800 parts old sand, 200 parts silica sand, 50 parts fire clay. This sand will show a moisture content of 6 per cent and a permeability of 15. Facing for larger castings up to 35 pounds in weight is only slightly different. The amount of each ingredient is the same, but the silica sand is coarser and the permeability is given as 22 instead of 15 as in the first instance. It is difficult to find silica or bank sands of such fineness and for this reason, nonferrous foundrymen usually use naturally bonded sands of equal fineness. In the ensuing discussion attention was directed to the well known fact that clay may be had under many forms and that the colloidal content may vary to a considerable extent. Method of mixing the sand is one of the most important factors.

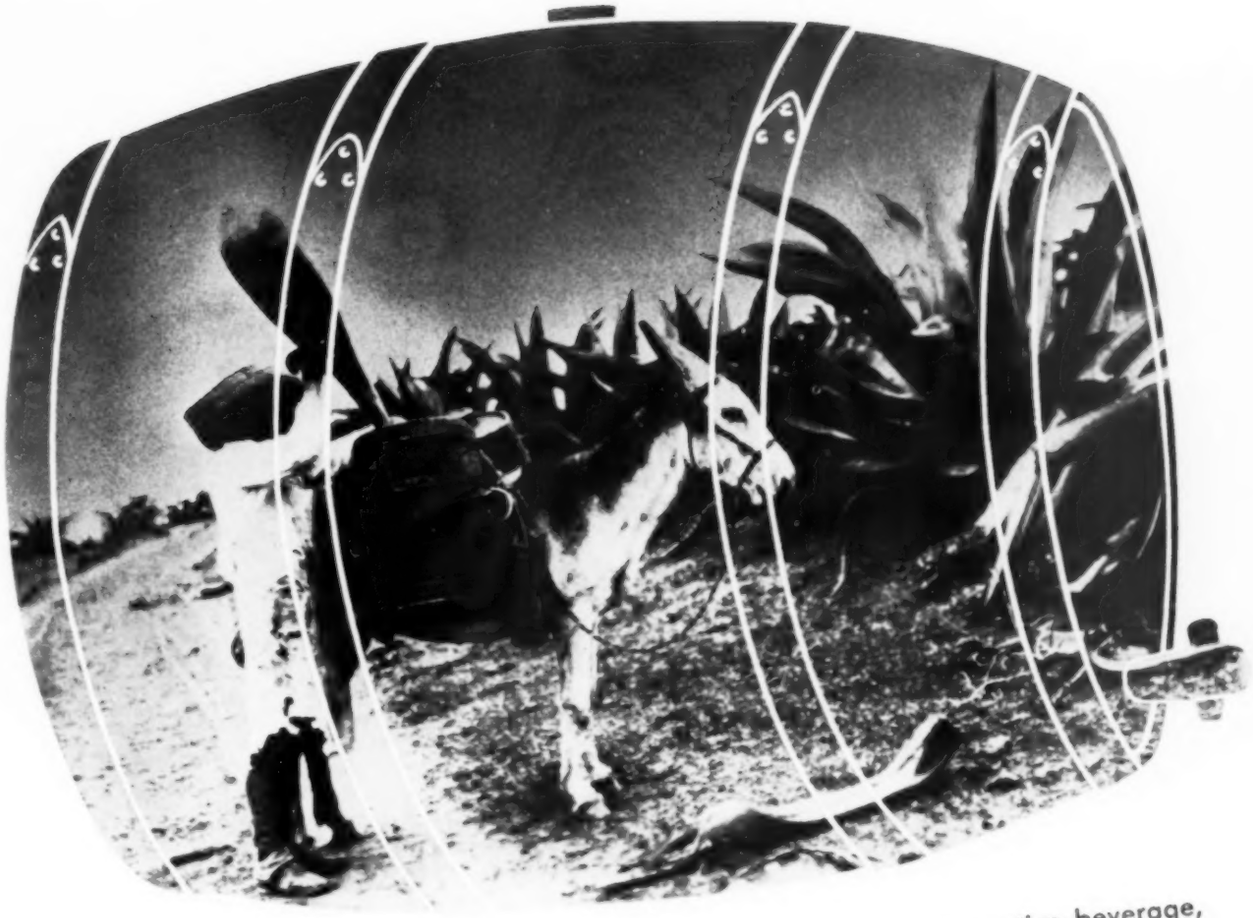
Alloy Irons Discussed

Practical aspects of production of alloy cast irons were discussed by R. G. McElwee, Vanadium Corp., of America, Detroit, at a session presided over by H. H. Judson, foundry superintendent Goulds Pumps Inc., Seneca Falls, N. Y. By way of introduction the speaker directed attention to the close connection between quick anneal malleable iron and the so called high test gray iron. While temperature is an important factor in the production of alloy irons, the time factor is even more important and must be determined accurately not only in the melting period, but also during the cooling period and if necessary during the subsequent heat treating period.

Alloy irons may be divided into three general classes: Low, based on aluminum, ferrosilicon, calcium silicide and zirconium; medium, containing nickel, chromium, vanadium, molybdenum, copper, boron; high alloy includes proprietary metals known as niresist, nihard, nichrome, nicrosilal. The time element may account for the fact that the electric furnace is preferable to the cupola in melting alloys. In the speaker's opinion too much importance is attached to the ordinary 1.20-inch diameter test bar. To draw intelligent conclusions, the shape and thickness of the bar should correspond to those in the casting. Interesting results showing the effects of the additions of various alloys to a common base mixture and then pouring the metal into a wedge test bar 16 inches in length, were presented.

At the steel casting session in the afternoon under the chairmanship of T. H. Burke, Otis Elevator Co., Buffalo, N. Y., a paper on modern trends and developments in steel castings was presented by V. T. Malcolm, metallurgist, Chapman Valve Co., Indian Orchard, Mass. The speaker pointed out that the use of special steel has grown to such an

(*Concluded on page* 52)



ELIXIR for CHILL CONTROL

From the "Rose of Mexico" comes the native beverage, Pulque. To millions, this serves to stimulate and fortify the body against fatigue and common ailments of a torrid climate... From this same interesting land comes a mineral—rich in controllable properties, which, when skillfully prepared by the United States Graphite Company, becomes the dependable "elixir" of many a grey iron and malleable foundry—No. 8 MEXICAN GRAPHITE.

Dustless and of carefully graded particle size, No. 8 MEXICAN GRAPHITE when simply added to your molten iron either at the spout or in the ladle, accurately controls the chill of your castings—resulting in greatly improved machinability . . . Descriptive bulletins will be gladly mailed upon request!

(Photo Courtesy Panama Pacific Line)

THE UNITED STATES GRAPHITE CO.
SAGINAW MICH.

NO. 8 MEXICAN GRAPHITE

(*Concluded from page 50*)

extent in recent years that the foundry industry necessarily must adapt itself to the changed technique. An enumeration of the various types of steel was followed by a rather extended description of the alloys usually employed and their effect either singly or in combination on the properties of the resulting castings.

The author went into considerable detail on the shop technique involved in the production of special steel castings, molding, pouring, sand conditioning and melting practice. Other features to receive attention included shrinkage, blowholes, pouring temperature and heat treatment. In discussing testing methods he claimed they can be grouped into two classes, destructive tests that can be applied economically to small castings, and nondestructive tests, which of necessity must be used on larger and more expensive castings. In addition to the ordinary methods of testing, the author, through a series of slides, illustrated application of the x-ray and gamma ray tests in the detection of hidden flaws. At the same session W. J. Corbett, works manager, the Atlas Steel Casting Co., Buffalo, presented a paper on steel foundry practice, in which he discussed the importance of design, pattern construction, methods of molding, general planning for production and the variables constantly encountered. In many cases long practical experience is the only guide on which the foreman can depend in setting the shrinkage allowance. Generally accepted allowance for machining is ⅛-inch. Importance of proper gates and risers was stressed and many of the factors involved were covered at considerable length. Purpose and application of chills and brackets were described in detail.

Consider Silicon as Alloy

The role of silicon in nonferrous castings was discussed by H. W. Gillett, technical adviser, Battelle Memorial institute, Columbus, O., at a nonferrous castings session under the chairmanship of A. Lockwood, Lumen Bearing Co., Buffalo. Following a brief reference to the physical properties of the metal and to its history the speaker referred to early German experiments in the use of the element in combination with other elements, the base of all present alloys susceptible to heat treatment. As an alloy in the aluminum industry silicon has wide application. On copper base mixtures the situation is still indefinite. Silicon additions make the bronzes sensitive to gas and lead. Traces of lead in silicon aluminum bronze have been known to reduce the tensile strength from 10,000 to 20,000 pounds per square inch. Contamination may come from hearth of the furnace unless furnace is operated solely on the special metal. Care should be observed to segregate the scrap in the foundry and machine shop.

In the last session on the program, with Professor A. E. Wells, department of mechanical engineering, as chairman, Donald J. Reese, foundry engineer, development and research division, International Nickel Co., Bayonne, N. J., presented a paper which covered many phases of the cupola melting process, including proportion of coke, limestone and iron, effect of steel additions to the charge, blast pressure and volume, size and position of tuyeres, diameter and height of cupola. He illustrated and described a front slagging spout where the proper elevation of the outer end of the spout is found by dividing the blast pressure by 4 and adding a half inch. Thus if the blast pressure is 20 ounces the outer end of the spout will be 5½ inches higher than the tap hole.

At the banquet Friday night in Willard Straight hall at which Dan M. Avey, secretary-treasurer of the American Foundrymen's association acted at toastmaster, brief addresses were delivered by Dr. E. E. Day, president, Cornell university, and by H. B. Hanley, foundry manager, American Laundry Machinery Co., Rochester, N. Y. The principal address was delivered by Cameron Beck, director, New York Stock Exchange institute, who had for his theme the present state of the nation and what should be done about it.

Book Review

Metal Statistics, 1937, edited by B. E. V. Luty and N. J. Langer, 592 pages, cloth, published by the *American Metal Market*, 111 John street, New York, and supplied by THE FOUNDRY, Cleveland, for $2.00 and in Europe by the Penton Publishing Co. Ltd., London.

This thirtieth annual edition contains the same general assortment of statistical information on ferrous and nonferrous metals and miscellaneous economic subjects as earlier numbers. Numerous new additions and improvements have been made, however, in the nonferrous metals department.

Transmission Engineering Co., 116 New Montgomery street, San Francisco, has been appointed representative of the Falk Corp., Milwaukee, in northern California. The office will be in charge of A. Pedersen.

Making Molds for Truck Frames

TWO roller conveyors are employed to carry the cope molds for truck frames from the molding machines to the point where molds are closed and poured. Flasks are returned to the machine on roller conveyors. Illustration courtesy Standard Conveyor Co., St. Paul

A quiet hour in the ingle nook

The Adventures of Bill

—by Pat Dwyer

AT SOME time in the future," I said to Bill the other night, "probably at a time when I have retired to the chimney corner to drool over a saucer of gruel, I shall look more deeply into certain questions, or perhaps more properly speaking, problems which at one time or another have aroused my curiosity. Ideas on the various subjects pop up occasionally, but for one reason or another I never have given them the attention warranted by their importance. Up to the present and presumably up to the time I hobble into the chimney corner and drop the plow handles for the last time, I have been and will be so fully occupied in shoving the daily grist through the mill, that the extra burden has remained and will remain on the shelf. If that is not sufficiently clear then all I have to say is that is your hard luck. If you think I am going to rewrite it for the purpose of explaining the connection of plow handles and shoving grist through the mill, my reply is that you probably will derive more pleasure from criticising a mixed metaphor, than you would from a plain, cold, stony statement.

"A second reason, if you really insist on a second reason, for my dilatory tactics is that the problems almost without exception present themselves on the most inopportune occasions. For example a random suggestion flashes into my mind after I have curled up for the night in my little downy nest. Is it reasonable to assume that I should stay awake wrestling with a proposition at imminent risk to my health and well being? In another situation suppose I am sitting decorously in a pew, listening to —to use your own expression—a clerical gent expounding a knotty point in theology, or possibly and more probably in high finance, when one of these problems plucks me by the mental sleeve and begs for a little attention. Surely common courtesy to the speaker demands that I should dismiss the interloper, gently of course, but firmly. I regret to say that because I close my eyes on these occasions I have been accused of sleeping. Seems to me that somewhere in his memoirs the patriarch Job has a few pertinent words on the probable fate of pickle pusses who indulge in base insinuations."

"I wouldn't know about the base insinuation stuff," Bill said, "and I am not as familiar as perhaps I should be with the works of your friend Job. All I can remember is that he had more boils to the square inch than a cucumber has warts, that he spent considerable time sprinkling ashes over his hair and beard and the remainder cursing the day he was born. I am willing to admit that even one boil is sufficient to distract the attention

Should be handled with pair tongs

and pious meditation of one of the old time anchorites in the desert. Which reminds me of the young monk of Siberia."

"What about the young monk of Siberia?"

"Never heard of him, eh? Quite a lad. I don't mind where I heard of him first, but I imagine it must have been in my apprentice days when the gang sat around a noble salamander at noon time, eating lunches out of tin buckets and indulging in free and easy conversation. Some of the wit was decidedly elementary and the language at times almost as rough and tough as some of the stuff now appearing in popular works of fiction and in some of the stage offerings. Just goes to show how times change. I picked up one of these books in the library the other day and leafed through it to see wherein it merited such high praise from all the book reviewers. The intelligentsia had seized upon it eagerly as the outstanding book of the year. Occasional club activity references in the newspapers showed me that the book was a favorite subject for discussion before women's clubs here and there. Maybe I am getting soft and tender through old age, but I give you my word some of the stuff —stuff is not the word I have in mind, but it will serve for the moment—some of the stuff in that book would curl the hair and bring a blush to the face of a graven image."

"What about the young monk from Siberia?"

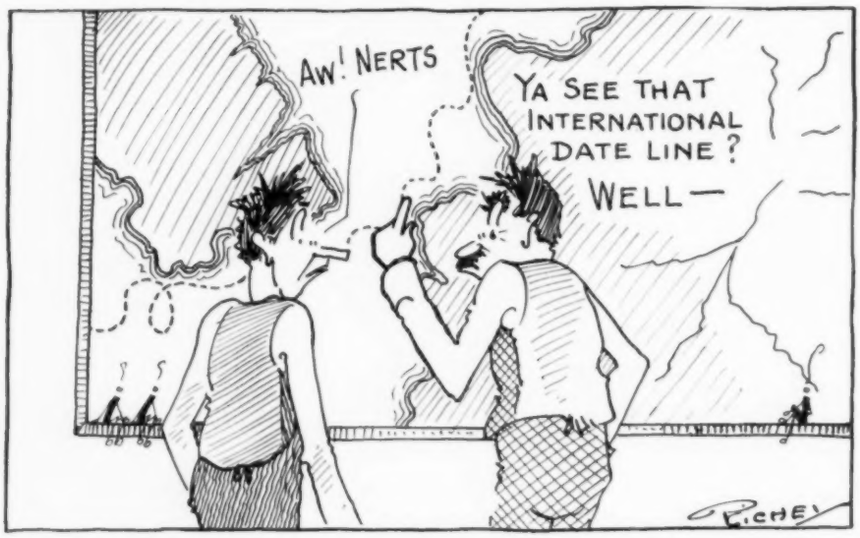
"I was coming back to him. I merely wanted to point out that a great deal of the salty wit and repartee of the old salamander days was salty and witty because it popularly was supposed to be wicked. Outside convention sternly frowned upon certain words and phrases and

upon allusions to certain subjects. In the sacred circle around the salamander every man felt perfectly free to discuss any subject he pleased and to use any words that came to his mind. The entire session might be described as a rough and tough mental wrestling match with no holds barred and without benefit of umpire or manager.

"Under present conditions I am inclined to the opinion that some of sorties, onfalls, sallies, head locks, arm locks and other forms of attack on the citadel of wit, would fall pretty flat. In the old days when life moved at a slower tempo and vaudeville actors could get by on one set of moth eaten jokes for several years, we were quite pleased with our noon day flashes of wit, including as I mentioned some time back, the jolly limerick about the young monk from Siberia."

"Ah, yes. The young monk from Siberia. Friend of yours? He may have been a young monk at one time but at the rate you are going he will be cased in a block of ice like one of the prehistoric mammoths dug up in that country occasionally, before you have finished. Incidentally do you happen to know at what period and in what particular locality this more or less mythical character flourished? Strange as it may seem, yours is the first reference I have heard or read on a colony, a monastery or even a stray monk in Siberia. Mujiks, yes. Hunters and trappers, yes. Gold hunters, yes. Political prisoners, yes. But definitely, no monks. And what is the answer to that, my fine young feathered friend?"

"Well," said Bill, "I'll tell you. I doubt very much if the gang around the salamander either knew or cared about such trifling details. To my certain knowledge approximately one half of the crew did not know whether Siberia was animal, vegetable or mineral. The remainder of the gang had a vague notion that it was a narrow strip of land up somewhere near the north pole where the Russian government operated a salt mine with convict labor. For all I know to the contrary some nimbel witted lad may have been inspired to compose the limerick about the young monk after reading a rather popular book of the period, *Siberia and the Exile System,* by George Kennan. I never read the book. If you want to follow down that clue, why, blessing on thee, little man, go to it.



Where Yukon Jake bought him the whole of Shark Tooth shoal, a reef in the Bering sea, and lived by himself on a sea lion's shelf in lonely in-iq-uity!

"The little man has neither the time nor the inclination to follow clues leading to the possible solution of a problem in which he has not the slightest possible interest. Likewise, furthermore and in addition thereto, I have done all the following I intend to do for one night. I have reached a point now where I do not care whether the young monk came from Siberia or Sumatra, Samarkand or the Sahara desert. Add up the first column carefully, set down four and carry one and what's the answer?"

"Why," said Bill, "the answer is the young monk from Siberia. 'Tis a great pity you cannot borrow a leaf from the life book of these holy men and learn to control your tongue. I have been told—I never hobnobbed with any of 'em as you might say personally—I have been told that for days and sometimes weeks, some of these birds never open their mouths, except maybe once or twice a day while gnawing a stale crust washed down with a gill or perhaps a gill and a half of rain water collected in a cistern on the roof. They do not bandy words, engage in frivolous conversation or interrupt honest citizens attempting to tell a story. I'll give you one more chance. Do you or do you not want to hear about the young monk from Siberia?"

"No," I said. "No. On second thought, No. Finally in conclusion and after mature consideration, No! I trust I make myself clear."

"Brief and to the point. I get you. In other words you are just dying of curiosity. Do you know, I am almost sorry I brought the subject up in the first place. Something you said reminded me of the young monk. I would have let it go at that and said no more about it if you had not been so insistent. The little trifle in itself is of no particular interest or importance, except perhaps that it illustrates how public opinion changes in a comparatively short period. When I was a boy this limerick about the young monk was regarded as devilishly wicked and witty and heard only in low resorts, foundries, saloons and other places frequented exclusively by low browed males. If the present trend continues I shall not be surprised one of these days to pick up a nice little illustrated book for the kiddies and find the immortal young monk included in the Mother Goose rhymes: There was a young monk from Siberiah, whose life kept getting dreariah and dreariah. One day be broke out of his cell with a hell of a yell and ran off with the Mother Superiah!

"However," said Bill, apologetically, "If my memory is in good working order, you were saying something about miscellaneous problems, before you insisted on hearing all about the young monk. I trust this brief and reluctant digression on my part has not thrown you off the track."

"Singularly enough," I said, "your reference to Siberia reminds me of a curiosity provoking item I read in a paper recently. All about a bronze figure of Christ set up on King island in the Bering sea. I never have been up in that section of the country and the international date line always gives me a headache when I try to figure it out. In a general way I have labored under the impression that outside a few wandering Esquimaux and an occasional whaler or sealer, no human beings infested that neck of the woods. Why should a bronze statue be erected in a place where no person ever will see it?"

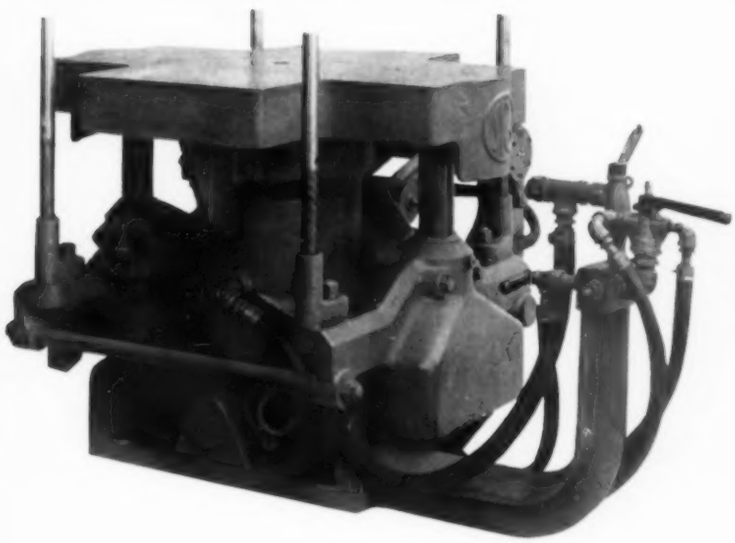
"Well," said Bill, "I'll tell you. The same question might be asked regarding many statues in great and populous cities. Thousands of people pass them every day without

(*Concluded on page* 70)

SPO

JOLT STRIPPER MOLDING MACHINES

Ideal for short-run production



SPO NO. 307 JOLT STRIPPER MOLDING MACHINE

Table Size	25" x 30"
Lifting Pin Centers—Lengthwise	16" to 24"
Lifting Pin Centers—Crosswise	15" to 26"
Jolt Cylinder Diameter	7"
Jolt Capacity @ 80 lbs. Air Pressure	1,200 lbs.
Pattern Draw	8"
Size Vibrator Furnished	1⅝"
Shipping Weight Approximately	1,200 lbs.

One of the many foundries using this machine is the Western Foundry Company, Chicago.

SPO, Incorporated

Manufacturers of a complete line of Molding Machines and Vibrators

East 61st and Waterman Ave. • CLEVELAND, OHIO

VIEWING FOUNDRY DEVELOPMENTS AT SHORT RANGE

A NEW foundry addition of the Ford Motor Co. will be devoted to the production of alloy cast steel parts, it is reported. Casting methods are said to center around a centrifugal system, and one part to be cast by that method is a small transmission cluster gear now forged from steel. Experimental work on connecting rods, brake drums, axle housing and other parts indicates worthwhile savings. It is believed some changes also are being proposed in the method of casting the crankshaft to improve its properties and to cut costs.

* * *

A yellowish-red alloy for air, gas and water fittings, which machines well, contains 78 *per cent copper,* 3 *per cent tin,* 5 *per cent lead, and* 13.5 *per cent zinc. Its tensile strength will range from* 25,000 *to* 30,000 *pounds per square inch, the elongation from* 15 *to* 25 *per cent in* 2 *inches, the reduction in area from* 20 *to* 25 *per cent, and the brinell hardness number from* 45 *to* 55.

* * *

Cast steel hammers for hammermill grinders must resist abrasion and impact, and a suitable composition contains: Carbon, 0.25 to 0.35 per cent; manganese, 0.60 to 0.90 per cent; nickel, 1.75 to 2.00 per cent; chromium, 0.60 to 0.90 per cent, and molybdenum, 0.20 to 0.30 per cent. They should be heat treated and drawn for the best physical properties.

* * *

A new granular material for addition to any semiplastic concrete patching material has been developed which is claimed to add strength to those materials, and assists in making them resistant to oil and grease. It is used in place of portland cement in mixing a batch for floor repair, and patches can be carried to a feather edge without spalling.

* * *

Several factors should be considered in the application of insulation to the outside refractory walls. In the first place the temperature of the interface between the refractory and the insulation should not be greater than that which the insulation will withstand safely withut excessive shrinkage. In the second place the addition of insulation might have a harmful effect on the inner refractory lining, causing shorter life and higher maintenance costs. Consequently, consultation with a refractory manufacturer may save considerable grief.

* * *

BUILDING up of fine material in molding sand has an extremely deleterious effect upon permeability, and that is clearly illustrated in some experiments wherein 10 per cent 270-mesh sand was added to a 40-mesh sand. With that addition the permeability decreased from 500 to about 110. Addition of the same quantity of 140-mesh sand to the base 40-mesh decreased the permeability to 250 while addition of 10 per cent 70-mesh sand decreased the permeability to about 375.

* * *

A new high tensile strength solder, and all-metal flux for low temperature soldering of aluminum, cast iron, zinc-base alloys, stainless steel, monel metal, etc., recently have been developed. The solder melts at approximately 500 degrees Fahr. or slightly above that used for ordinary soft solder, and it is claimed that the tensile strength is considerably greater than with the soft solder. It can be used in foundries for filling in holes in aluminum and other castings, and can be machined, polished, and plated if desired. The special flux is supplied in conjunction with the solder to dissipate oxides on the surface of the metal preparatory to application of the solder.

* * *

After 4 years of continuous operation on the cooking range of a cafeteria, special cast lids and covers were found to be in perfect condition, notwithstanding the fact that the top of the range usually is at a dull red heat. Ordinary cast iron covers and lids had to be replaced every 4 months due to cracking and warping. The special lids and covers contained approximately 25 per cent chromium.

* * *

Since ladle additions of graphite to molten cast iron initiate graphitization, it was pointed out recently that the black wash employed on molds and cores has a similar effect, and in the case of iron on the soft side might result in a leaky casting or porous portions. With iron on the hard side, the tendency would be to soften it.

* * *

In placing a firestone lining in a cupola a 1-inch thick layer of stiff mortar should be laid on the backing brick splits to provide a cushion. The mortar should be composed of a mixture of 60 per cent ground firestone and 40 per cent highly refractory clay. From ¼ to ½-inch joints should be allowed between the firestone blocks for expansion, and the mortar used should be composed of 5 parts highly refractory clay and 1 part silica sand.

Northern Illinois

NORTHERN Illinois foundrymen's association held its annual Christmas party on Friday, Dec. 10 at the Hotel Faust, Rockford, Ill. One hundred twenty-five members and guests were present.

President C. M. Dale was in charge of arrangements. All present reported a most enjoyable evening.

Southern California

SOUTHERN California Chapter of the American Foundrymen's association held its first annual Hi-Jinks on Thursday evening. Dec. 16, 1937. Approximately 200 members and guests attended. Meeting at the Mona Lisa cafe, Los Angeles, dinner was served at 7 o'clock. Chairman Robert Gregg turned the meeting over to the entertainment committee, immediately following dinner. S. S. Brown, H. L. E. Meyer Jr. & Co., acted as toastmaster for the evening.

A very interesting entertainment program was enthusiastically received, which was followed by an attractive floor show. W. A. Ashman, Balfour, Guthrie & Co., was chairman of the entertainment committee and his effort in putting over this first *get together* for an evening of entertainment and enjoyment, was appreciated by everyone.

Quad-City

DECEMBER meeting of the Quad-City chapter was held Dec. 20 at the LeClaire hotel, Moline, Ill., with 90 present. P. T. Bancroft presided. A committee was appointed to arrange the next regional meeting in the Quad-City area, and it includes Horace Deane, Deere & Co., Moline, T. J. Frank, Frank Foundries Corp., Davenport, Iowa, and B. F. Henninger, International Harvester Co., Rock Island, Ill.

Phillip DeBruyne, superintendent, Moline Malleable Iron Co., St. Charles, Ill., spoke on malleable cast iron, and touched upon the history of work done in that field in the Tri-Cities. He also mentioned the importance to the industry of having technical men, practically trained men, and engineers to carry on the work. Types of various malleable iron castings were discussed and compared to those of earlier days. Necessity of keeping up with changes in required specifications, and in fields of application was pointed out. In addition Mr. DeBruyne described annealing and melting of malleable cast iron with special reference to new equipment which enables production of good castings in less time.

Following Mr. DeBruyne's presentation numerous questions were asked relative to alloys used in making malleable castings, and to features of several commercial malleable cast irons. The next meeting of the Quad-City chapter will be held at the Fort Armstrong hotel, Rock Island, Ill., on Jan. 17.

Philadelphia

METROPOLITAN Philadelphia chapter of the American Foundrymen's association held its regular monthly meeting at the Engineers' club, Philadelphia, Dec. 10. Attendance was excellent with 125 present for dinner and 165 attending the meeting. Following the dinner, Kern Dodge showed colored movies taken on one of his air trips through the southwest to San Francisco.

P. E. McKinney, chief metallurgist, Bethlehem Steel Co., Bethlehem, Pa., spoke on "Steel Castings". Mr. McKinney traced the development of the steel founders' art from the earliest beginnings and pointed out the difficulties encountered when the first steel castings were made according to iron foundry methods. Melting point of casting steel is from 400 to 500 degrees higher than gray iron and the linear contraction of steel is about twice that of average cast iron; likewise volume contraction during solidification and cooling of cast steel is more than twice that of gray iron which requires extremely large risers, heads and gates for adequate feeding.

While the theoretically ideal cast shape is the conventional steel ingot, it was pointed out that any departure from this shape brings about difficulties in casting. With the intricacies of design that confront the steel foundrymen today, many varied and ingenious methods have been devised to equalize the rate of solidification through the use of special heading, chills, etc., but the laws of nature governing directional solidification of steel must be observed in the design of all castings.

Mr. McKinney spoke on the original prejudice against the use of welding as a repair and production tool, and he stated that the steel foundryman was more or less responsible for that condition. Today, however, far-sighted investigators have shown that the use of welding is not a reflection on the product of the foundry, but it has been the means of obtaining a stronger and better designed structure than would have been possible with casting or welding alone.

Liquid or drastic air quenching of castings, while often feasible with small or simply designed castings, seldom is recommended for intricate shapes—for the latter will usually have far less integrity in actual service than would be the case if less drastically heat treated.

Nondestructive testing of castings by radiography has been, until recently, one of the most controversial issues confronting the steel casting industry. Foundrymen were inclined to regard with suspicion any suggestion that their product be so critically examined. Today, however, the interpretation of radiographs is carried on more intelligently and castings are not condemned because of minor flaws ap-

pearing on the negative. In fact, certain designs containing recognized limitations are being used by some consumers with the full realization that weaknesses in certain sections will probably develop. This has been made possible by the intelligent application of radiography and welding.

In concluding his talk, he pointed out that his discussion had been concerned with the problems involved in the production of so-called jobbing castings rather than those produced in large quantities from the same pattern equipment under highly standardized conditions. The audience was then shown a picture of probably the largest steel casting made to date. It was made by Bethlehem and weighed 215 tons.

Buffalo

BUFFALO chapter of the American Foundrymen's association held its regular meeting at the King Arthur restaurant, Buffalo, Dec. 6. Theodore H. D. Burke, Otis Elevator Co., and chairman of the chapter, presided. The principal talk was given by Theodore F. Hatch, director of the (Associate) division of Industrial Hygiene, Albany, N. Y. Mr. Hatch spoke on numerous phases of dust control and the silicosis problem.

In opening the meeting, Mr. Burke introduced H. B. Hanley, superintendent, American Laundry & Machinery Corp., Rochester, N. Y. and a director of the A.F.A. Mr. Hanley thanked the Buffalo chapter for its assistance in staging the recent regional conference at Cornell. A buffet luncheon followed the meeting.

New England

AN INTERESTING talk, "Where Are We Going To Get Our Molders in the Future?" by J. E. Goss, Brown & Sharpe Mfg. Co., Providence, R. I., featured the regular meeting of the New England Foundrymen's association held in Boston, Dec. 8. Mr. Goss discussed at length the apprenticeship system as it is carried out in the Brown & Sharpe plant, and explained the benefits derived from such a system, both from the standpoint of the employer and the employe.

He showed that when a similar system was used, a loyal feeling definitely is instilled in the employe from the start. Later this becomes an asset in times such as the present, when strained employer-employe relations are being felt in many industrial organizations. The speaker has given considerable study to the problem of future replacement of journeyman molders now in service, and feels that immediate action must be taken if this situation is to be remedied for the benefit of the industry in the future.

Following the formal talk, the subject was discussed further by H. Blumenauer, Arcade Malleable Iron Co., Worcester, Mass., and Henry Jensen, General Electric Co., Lynn, Mass. At the conclusion of the meeting, President Saunders entertained the members with some excellent moving pictures he has taken.

New Jersey

NEW JERSEY Foundrymen's association recently elected William P. Laytham, William P. Laytham & Sons, Patterson, N. J., as president, succeeding Walter H. Cole, Moore Bros., Elizabeth, N. J., who retired after serving for 3 years. G. W. Hannay, Barnett Foundry Machine Co., Irvington, N. J., was elected vice president, succeeding Mr. Laytham. John L. Carter, 83 Polk street, and J. A. Williamson, Isbell Porter Co., Newark, were reelected secretary and treasurer, respectively.

Donald J. Reese, foundry engineer, International Nickel Co., Bayonne, N. J., was the feature speaker of the occasion, which was attended by more than 80 persons. Mr. Reese spoke on "Practical Phases of Cupola Operation," discussing the furnace itself, auxiliary equipment and the technique of cupola melting practice among various other phases. The labor situation came in for discussion.

Chicago

HYGIENE in the foundry was the subject for discussion at the regular monthly meeting of the Chicago chapter, American Foundrymen's association, held at the Medinah club, Chicago, Dec. 13. Warren Cook, superintendent, engineering department, Zurich General Accident & Liability Insurance Co., Chicago, was the principal speaker. E. O. Jones, director, safety and hygiene section, American Foundrymen's association, acted as technical chairman. About 100 members and guests attended.

Mr. Cook recommended that foundries devise a systematic plan in attempting to provide a plant that is free from unnecessary dust. He suggested first checking various operations and equipment to determine what changes can be made that do not involve capital expenditures. He pointed out that some rearrangement of plant facilities can be made whereby the installation of dust removal equipment can be simplified, such as providing a centralized shakeout.

Mr. Cook warned against carelessness in fighting the silicosis hazard, remarking that the activity toward dust removal, intense during the past several years, may be followed by a lack of care in this respect once progress has been made toward the elimination of silicosis.

While foundries have received considerable publicity from the standpoint of the occupational disease hazard, other industries are equally susceptible to .the contraction of diseases resulting from working conditions, according to Mr. Cook. He stated that insurance company engineers have acquired considerable experience in combatting silicosis and should be consulted with regard to dust control problems.

Chicago Lecture Course

The 1938 foundry lecture course of the Chicago chapter of the American Foundrymen's association, covers basic subjects of general foundry practice. This is the third course presented by the chapter and is offered primarily for operating foundrymen, apprentices, and students desiring to broaden their vision and knowledge of general foundry problems. The first lecture will be held on Jan. 17 and the program for the complete course is as follows:

January 17

"Iron from Mines to Finished Castings," by H. A. Strain, Carnegie-Illinois Steel Corp., South Works, South Chicago, Ill. Technical chairman, W. E. Brewster, Wisconsin Steel Co., Chicago.

January 31

"Molding and Coremaking Materials," by H. L. Campbell, American Hoist & Derrick Co., St. Paul. Technical chairman, J. D. Burlie, Western Electric Co., Chicago.

February 21

"Sand Testing and Demonstrations of Sand Testing Equipment," by Harry W. Dietert, H. W. Dietert Co., Detroit. Technical chairman, A. W. Gregg, Whiting Corp., Harvey, Ill.

March 7

"Elementary Metallurgy," by L. F. Lottier, Peoples' Gas Light & Coke Co., Chicago. Technical chairman, H. K. Briggs, Western Foundry Co., Chicago.

March 28

"Elementary Metallurgy," A continuation of lecture No. 4 by Mr. Lottier. Technical chairman, F. E. Fischer, Sloss-Sheffield Steel & Iron Co., Chicago.

April 4

"Melting Practice," by G. P. Phillips, International Harvester Co., Chicago. Technical chairman, M. K. Wells, Chicago Foundry Co., Chicago.

April 18

"Faulty Castings, Causes and Remedies," by A. J. Busch, C. C. Kawin Co., Chicago. Technical chairman, A. W. Weston, Chicago Hardware Foundry Co., North Chicago, Ill.

May 2

"Foundry Practice Around the World," by W. F. Piper, Beardsley & Piper Co., Chicago. Technical chairman, R. E.

(*Continued on page* 64)

THE ALCHEMIST
by ADRIAN VAN OSTADE
1610-1680
Original located in London
Ohio Ferro-Alloys Corporation
Canton, Ohio
Reprinted by permission D. D. Berolzheimer, 50 E. 41st St., N. Y. City.

(*Concluded from page* 62)

Kennedy, American Foundrymen's association, Chicago.

Two plant visits have been arranged. The first is to the McCormick works, International Harvester Co., Blue Island and South Western avenues, Chicago, and the second to the South Works, Carnegie-Illinois Steel Corp., South Chicago, Ill.

Northern California

NORTHERN CALIFORNIA chapter of the American Foundrymen's association held its regular monthly meeting at the Athens Athletic club, Oakland, on Dec. 10. Attendance was affected somewhat by the season's demand on the members' time, but those who attended enjoyed a good dinner and the fellowship of four new members and several visitors.

Paul Eliel, director, industrial relations, Stanford university, presented the principal address of the evening and reviewed the past and present of the labor situation. An announcement was made of the chapter's meeting with the Golden Gate chapter of the American Society for Metals at the Engineers' club, San Francisco, Jan. 17, and of the joint meeting of the two California chapters of the A.F.A. at Del Monte, Calif. on Feb. 10, 11 and 12. Reports of membership, program and special committees were of interest to those present.

Reading

REGULAR monthly meeting of the Reading Foundrymen's association was held in Wyomissing club, Reading, Pa., on Dec. 21, and was called to order by President Greenstreet, with 19 present. An interesting report was rendered by the committee, which appeared before the examiner of the Industrial Board, at Harrisburg, Pa., asking for exemptions under the new general 44 hour law, for the foundry industry.

The speaker of the evening was Col. E. C. Spring, director of the National Safety council, and representative of the Pennsylvania Manufacturers' association. His subject was the value of safety work among industrial employes. Col. Spring stressed on the human factor in safety work. He showed our members that their employes are ready and willing to cooperate with them in constructive work to bring about more desirable working conditions in the plant, which will benefit both employer and employe alike.

He stated that the principal requirement for a successful safety program in any industry is interest on the part of the owner of the business, as well as the executives on down the line, and that the tendency of some executives to detail this to some subordinate usually acts as a detriment to any safety program. He urged owners of foundries to take an active interest in furthering safety work among their employes and to talk these matters over with their subordinates and with the men themselves.

He illustrated that many industries frequently engaged outside talent, to develop programs of this kind when they can get better cooperation and better advice, and work up a better program by utilizing the collective knowledge of their own men who are ready and willing to cooperate, if only the employer will show that he personally is interested enough to ask for their cooperation on this important subject.

While production in a number of foundries has fallen off during the past month in this district, our foundries as a whole seem to be faring better during the present recession than most other business and industry in this locality. There was an optimistic feeling expressed by members present that conditions would improve greatly after the first of the year in the foundry business.

Northeastern Ohio

THE annual Christmas party of the Northeastern Ohio chapter of the American Foundrymen's association, which was held in the ballroom of the Hotel Hollenden, Cleveland, Thursday evening, Dec. 16, attracted approximately 600 members and guests. Arrangements were in charge of a committee headed by L. P. Robinson, Werner G. Smith Co., Cleveland, and vice chairman of the chapter.

A floor show, which followed the dinner, was the feature attraction of the program.

North Jersey

PROGRAM of the regular meeting of the North Jersey Nonferrous Founders' association, held at the Essex house, Newark, N. J., Dec. 16, featured a talk "Some Common Defects in Nonferrous Castings —Causes and Cures" by W. G. Reichert, metallurgical engineer, Singer Mfg. Co., Elizabeth, N. J. Mr. Reichert discussed five important factors in producing sand castings, namely melting, molding and coremaking, gating, feeding and risering, and correct pouring temperature.

The speaker emphasized particularly the importance of having a slightly oxidizing atmosphere. He described how gases get into the metal and how they may be eliminated, and referred to the importance of melting as rapidly as possible. Mr. Reichert gave a complete and concise statement of the importance of sand control and the effect of moisture, permeability and association, presided. He introstrength in the producing of good castings. Various casting defects were illustrated by a number of lantern slides. The speaker indicated how the cause of the defect could be determined and showed charts indicating the effect on permeability of mixing fine and coarse grain sands in various proportions. He also discussed the effect of high mold temperatures on sand.

John L. Carter, secretary of the duced W. E. Day Jr., Mack Mfg. Corp.; F. B. Diana, Whipple & Choate Co. of the Connecticut Nonferrous Foundrymen's association.

Foundry Conference At Birmingham

Sixth annual joint conference of foundrymen and engineers, sponsored jointly by the Birmingham chapter of the American Foundrymen's association, the Birmingham section of the American Society of Mechanical Engineers, and the American Foundrymen's association, will be held in Birmingham, Feb. 24 and 25.

Various sessions will be in the nature of a symposium on "Mechanics of the Cupola and Its Auxiliary Equipment," with the subjects covered from an engineering and operators standpoint. R. R. Deas Jr., American Cast Iron Pipe Co., and George R. Ozley, Alabama By-Products Co., chairmen of the A.F.A. and A.S.M.E. chapters respectively, will act as general chairmen of the meeting. W. O. McMahon, Sloss-Sheffield Steel & Iron Co., is chairman of the Birmingham chapter program committee.

The tentative program is as follows:

Thursday, Feb. 24

A. M.—Registration—Hotel Tutwiler
Session—The Cupola Furnace; Design, Construction, Maintenance of Balanced Blast, Hot Blast, and Standard Cupolas.
P. M.—Session—Cupola Charging Equipment

Friday, Feb. 25

A. M.—Plant Visitation
P. M.—Session—Cupola Blowing Equipment
Evening—Annual Dinner Meeting

Milwaukee Chapter Plans Regional

A two-day regional foundry conference will be held at the Hotel Schroeder, Milwaukee, Feb. 3 and 4, under the auspices of the Milwaukee chapter of the American Found-

(*Concluded on page* 67)

The

American Foundrymen's Association

Announces to Industry

The Foundry Show

to be held in conjunction with its

42nd Annual Convention

PUBLIC AUDITORIUM
CLEVELAND, OHIO

May 14, 16, 17, 18, 19, 1938

and

Invites Displays by All Companies Whose Products Qualify for a Place in This Show

Coming Together
Keeping Together = SUCCESS
Working Together

MILWAUKEE MOLDERS

Complete Line . . . . All Types and Sizes

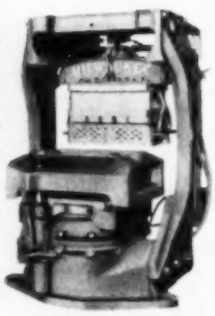
No. 103 Jolt Squeezer, stationary type with 10"squeezing piston. No. 104 portable type, also available.

No. 124 Jolt Squeezer, portable type with 12"squeezing piston. No. 123 stationary type, also available.

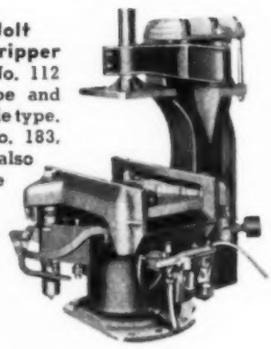
No. 131 Jolt Squeezer, with 13" squeezing piston. No. 181 size with 18" squeezing piston, also available.

No. 143 Jolt Squeezing Stripper with 14" squeezing piston. No. 163 size with 16" squeezing piston, also available.

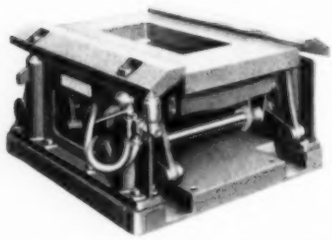
No. 214 Jolt Squeezing Stripper Mold Lift-Off with 21" squeezing piston. No. 244 size with 24" squeezing piston, also available.



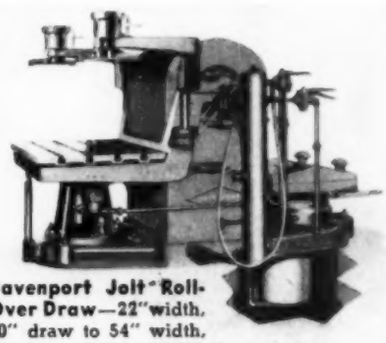
No. 142 Jolt Squeezing Stripper 14" piston. No. 112 stationary type and No. 113 portable type. 11" piston. No. 183, 18" piston, also available



No. 70 Core Grinder with 30" grinding wheel and 70" table. Speed of table, 2 to 5 r. p. m.



Power Strippers — 20" wide x 40" long to 50" wide x 72" long. 6" to 14" pattern draw.

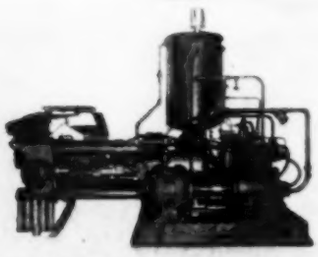


Davenport Jolt "Roll-Over Draw—22"width, 10" draw to 54" width, 24" draw. 750 to 10,000 lbs. capacity.

Every Milwaukee Molder is a fast, high production unit, easy to operate and ruggedly constructed for years of hard service. They enable you to produce quality castings at low cost.

•

Ask for descriptive literature. No obligation, of course.



No. 330 Briquetting Press — briquettes cast iron borings and crushed steel turnings. Capacity 2 to 3 tons per hour. Automatic hydraulic operation.

Davenport Plain Jolts

12"x12" to 72"x96" tables, 200 lbs. to 16,000 lbs. lifting capacity.

MILWAUKEE FOUNDRY EQUIPMENT CO.

3238 WEST PIERCE STREET • Cable Address "MILMOLDCO" • MILWAUKEE, WISCONSIN

A 2140-1P (1237)

(*Concluded from page* 64)

rymen's association, co-operating with the staff of the Mining and Metallurgical school, University of Wisconsin, Madison, Wis., according to a recent announcement of A.F.A. The program will consist of a series of simultaneous sessions on steel, malleable, gray iron and nonferrous foundry problems. In general the subjects to be covered by each of the discussion groups will be as follows: Melting, casting, sand, special metals, apprentice training, and foundry management.

Development of the program and selection of the speakers and discussion leaders is well under way by the committee of the Milwaukee chapter. Personnel of the committee includes co-chairmen W. J. MacNeill, Federal Malleable Co., representing the Milwaukee chapter, and Prof. E. R. Shorey, representing the Mining and Metallurgical school of the University of Wisconsin; D. C. Zuege, Sivyer Steel Casting Co., Charles I. Wesley, Wesley Steel Treating Co.; R. S. MacPherran, Allis-Chalmers Mfg. Co.; Oscar Frohman, Ampco Metals Inc.; and Prof. J. F. Osterle, University of Wisconsin.

GENERAL SESSIONS

Thursday, Feb. 3

9:00 a. m.—Illustrated talk on castings in relation to other departments, by A. L. Pfeffer, assistant general superintendent, pattern shop and foundries, Allis-Chalmers Mfg. Co.

12:30 p. m.—Luncheon. Program to be in charge of University of Wisconsin. Speaker will be some member of the athletic department.

1:30 p. m.—Apprentice training. Program to be arranged by V. J. Hydar, Falk Corp., chairman of the apprentice committee, Milwaukee chapter of A. F. A.

Friday, Feb. 4

12:30 p. m.—Luncheon. Program to be in charge of Milwaukee chapter. Speaker will be a metallurgist of international experience and reputation.

3:20 p. m.—Foundry management, by Dan M. Avey, secretary-treasurer of the A. F. A.

GRAY IRON SESSIONS

Thursday, Feb. 3

11:00 a. m.—Cupola practice
Discussion leader—George Long, Pickands Mather Co.

3:20 p. m.—Sand
Discussion leaders—H. W. Dietert, H. W. Dietert Co., and N. J. Dunbeck, Eastern Clay Products Co.

Friday, Feb. 4

9:00 a. m.—Electric cast iron
Discussion leader—Garnet P. Phillips, metallurgist, International Harvester Co., Chicago.

11:00 a. m.—Cast iron heat treatments and experiments
Discussion leader—O. T. Muehlemeyer, president, Metal Treating institute, Chicago.

1:30 p. m.—Molding problems and scrap clinic
Discussion leader—N. J. Dunbeck.

STEEL SESSIONS

Thursday, Feb. 3

11:00 a. m.—Cleaning room problems
Discussion to be led by a practical foundryman.

3:20 p. m.—Melting
Discussion leader, Harvey Payne, Pittsburgh Electric Furnace Co.

Friday, Feb. 4

9:00 a. m.—Molding and casting problems
Discussion leader—Eugene Silver, Smith Steel Foundry Co., Milwaukee.

11:00 a. m.—Sand
Discussion leaders—Messrs. Dietert and Dunbeck.

1:30 p. m.—Heat treating and flame hardening
Discussion leader—Raymond L. Rolf, metallurgical engineer, Lakeside Steel Improvement Co., Cleveland.

MALLEABLE IRON

Thursday, Feb. 3

11:00 a. m.—Melting
Discussion leader—L. J. Wise, Chicago Malleable Castings Co.

3:20 p. m.—Annealing
Discussion leader—Mr. Wise.

Friday, Feb. 4

9:00 a. m.—Molding and core problems. Scrap clinic
Discussion leader—M. W. Gleissner, Walker Mfg. Co., Racine, Wis.

1:30 p. m.—Sand
Discussion leader—H. W. Dietert.

NONFERROUS

Thursday, Feb. 3

11:00 a. m.—Sand
Discussion leader—H. W. Dietert.

3:20 p. m.—Brass and bronze castings
Discussion leader—George Klenk, Allis-Chalmers Mfg. Co.

Friday, Feb. 4

9:00 a. m.—Molding practice
Discussion leader—Mr. Klenk

1:30 p. m.—Aluminum alloys
Discussion leader—H. J. Rowe, chief metallurgist, foundry division, Aluminum Co. of America, Cleveland.

Cast Stove Was Made 100 Years Ago

The highly ornamental cast iron heating stove, shown in the accompanying illustrations, attracted considerable attention recently when displayed in a Midwest town during a local centennial celebration. The decoration is very elaborate and serves to increase the radiation surface in addition to its use as a purely ornamental feature. Even after the lapse of 100 years, every detail of the filigree work is sharp and clear on the castings, indicating that in all probability they were molded and cast from the original hand carved patterns. The various parts are thicker than modern stove plate castings, but otherwise they constitute a remarkable tribute to the technique, foundry knowledge, manual skill and dexterity of the foundrymen of those early days. According to a legend on the front, the stove was made by the firm of Hoffman & Potts, Albany, N. Y., probably about 1840.

Manufacture of stoves in the Albany district was inaugurated by certain former employes of John L. Mott, at Motthaven, N. Y. The pioneers established a foundry known as the Eagle Stove Works and this was the nucleus around which the extensive stove business of the district developed in later years. Early stove founders imported pig iron from Scotland and melted it in the air furnace. It is claimed that no stove maker could be persuaded to use any other than Scottish pig iron until about 1850. In 1835 the firm of Thomas & Potts was organized in Albany and is the first recorded user of a cupola for melting iron for stove castings. The name was changed to Thomas & Wells in 1836 and a year later was changed to Hoffman & Potts. Under this title the business was conducted until 1847 when Jesse C. Potts became sole proprietor.

The stove shown in the illustration is designed to burn short pieces of wood, introduced either through the double doors at the front, or through a door at the right side. The illustrations were supplied by Warren A. Smith, Smith & Richardson Mfg. Co., Geneva, Ill.

Three views of highly decorated cast iron stove

Fig. 13—Pig iron, coke and sand are unloaded by gravity from railroad cars

Expert Technique Needed

(*Continued from page* 27)

Research institute made up of leading meehanite foundries in the United States and they co-operate with a European institute with members in Great Britain, Germany, France, Belgium, Italy and Australia.

Published literature of the institute states that the objects are: To promote scientific research and conduct organized investigations in foundry, metallurgical and engineering problems. To make general improvements in the manufacture of castings. To maintain a high standard of uniform quality and dependability of product. To gather and disseminate information so that progress might be cumulative. Many foundry processes have been improved and have undergone radical changes. A wealth of knowledge on metallurgical data and engineering design has been collected and is available.

Physical properties of the metal as cast, heat treated, and alloyed are shown in the accompanying table. Class *A* metal shown at the top of the classification chart is suitable for a wide range of casting where exceedingly high strength or other special physical properties are essential. Castings of that metal constitute the major part of the foundry tonnage. Obviously close mechanical and chemical control is required in the melting department to secure a consistently uniform product according to anticipated requirements.

The foundry approximately 500 feet in length is divided longitudinally into three main bays with a pattern making and pattern storage department extending across all three at one end. The cleaning and shipping department occupying a somewhat larger space at the opposite end. Bench work is confined to the north bay, which also houses the cupolas, the coremaking department and a number of ovens for drying the large molds. Tracks from these ovens extend into the center bay where the cars are loaded and unloaded.

Dry Sand and Loam Molds

The center bay, spanned by four electric traveling cranes, is devoted to the production of large molds in dry sand and loam. In some instances the molds are made and dried in pits in the floor, but in the majority of instances the molds are made in flasks and dried in the ovens. Typical loam molds are shown in Figs. 4, 9 and 12, while a casting made in a similar mold to that shown in Fig. 12 appears in Fig. 5 as it is laid on the cleaning floor before the gates and risers were removed. Figs. 4 and 9 show views from opposite sides of a partly completed loam mold for a 9-ton marine engine cylinder, part of a reconditioning job on a steamer in an Atlantic port.

Only the outside part of the mold is built in loam. After the pattern has been removed and after the mold has been finished and dried, the interior is formed with a number of dry sand cores. The same general procedure is followed in making the mold for the crane drum shown in Fig. 12, with the exception that the outside face of the mold is formed with a sweep

(*Concluded on page* 70)

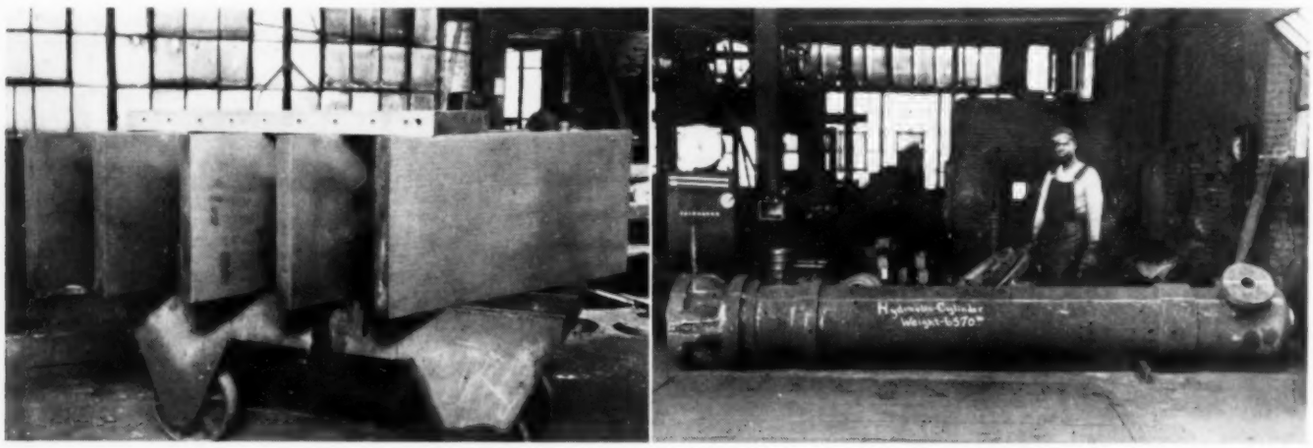
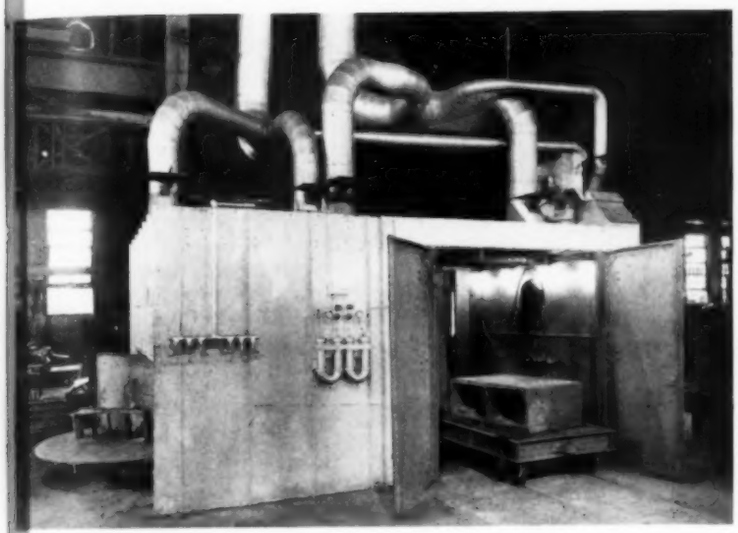
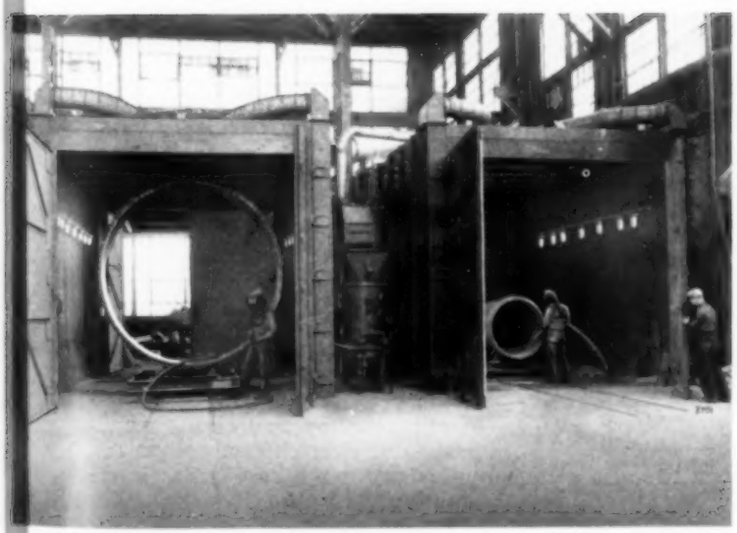


Fig. 14 (Left)—Hollow steam table plates must resist steam pressure from the inside and present clean machined surface on the outside. Fig. 15 (Right)—Hydraulic cylinders of various types are molded horizontally. The molds are set up in a vertical position before they are filled with metal

Modernize BASIC OPERATIONS



Double Blast Room in Foundry



Two large Blast Rooms for cleaning tanks before enameling

SLY BLAST ROOMS *open the door to more* PROFIT

The greatest advancement in the modern factory is the speedy, efficient results of Sly Blast Rooms for cleaning castings and heavy material of all kinds. The product of 60 years manufacturing experience, Sly Blast Rooms represent the final forward step in speeding up production.

Sly Blast Rooms use sand, shot or grit and are equipped with various handling accessories—turntable, monorail, car track—or any combination of these.

SLY FEATURES WORTH CHECKING:

- Triple baffle ceiling—3/16" steel.
- 3/16" steel liners protect walls and doors.
- Special light fixtures—Safety floor.
- Pressure blast tank—Mixture of air and abrasive by air flow.
- Simple in construction. Easy to operate.

THE W·W SLY MFG·CO·CLEVELAND·OHIO

(*Concluded from page* 68)

attached to a central spindle and no pattern is used. The core which forms the inside of the casting is made in several sections or thick

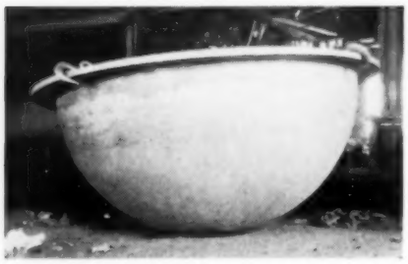


Fig. 16—Large pots for the chemical industry are molded in loam with spindle and sweep

disks. They are lowered into the mold separately and built one on top of the other with a thin layer of paste between to prevent entrance of any metal at the joints. Six small hard cores 2½ inches thick and 6 inches diameter, spaced equidistantly and resting on the bottom of the mold, support the main core. Six similar cores on the top supplemented by a number of stud chaplets prevent the core from rising when the mold is filled with metal. Two long sprues, built in cores on the outside of the mold, conduct the first metal to the bottom of the mold. The remainder of the metal then is poured through a ring of pop gates on the top.

In the third or south bay of the foundry, the patterns, so far as is consistent with economical operation are mounted on boards and rammed on a number of jolt, roll-over, ramming machines. Since long running jobs are the exception rather than the rule, a type of machine table and pattern board shown in Fig. 8 has been adopted to facilitate the frequent changes.

Two dovetail pieces of cast iron, accurately machined are bolted permanently to the molding machine table. Corresponding dovetails are attached to each pattern board. Thus when the required number of molds have been made from any given pattern, it is a comparatively simple operation to remove the board and substitute another.

Adventures of Bill

(*Concluded from page* 56)

a single glance and without knowing or caring whether the bronze figure represents Diana, Minne Ha-Ha or Scarlett O'Hara.

"I saw the same article to which you refer. My curiosity also was aroused on certain features, but instead of worrying, losing sleep and so forth over them, I inquired here and there and learned among other things that the statue was molded by the *cire perdu* or lost wax method and cast in one piece at the plant of the Roman Bronze Works, Brooklyn, N. Y. It stands 6 feet 7 inches high, weighs approximately 3 tons and was designed orginally by Samuel J. Kitson and completed by his widow. Final details after Mrs. Kitson's death early in 1937 were completed by her niece and assistant, Felicity Buranelli.

"Movement to erect the statue on King island was initiated by Father Bernard R. Hubbard, widely known as the *Glacier Priest* through his extensive exploration and reports on Alaska. The cost was borne by a friend who prefers to remain anonymous. The statue was shipped to Seattle, then by steamer to Nome and for the final 85 miles in the storm tossed, foggy and arctic waters of Bering sea, in walrus skin boats lashed together."

"Why, grand-PaPah!" I said, "You know everything, don't you?"

"I may not know everything, but I get around, my boy, I get around!"

Book Review

Machine Shop Operation, by J. W. Barritt, fabrikoid, 791 pages, 8¼ x 10¾ inches, published by the American Technical Society, Chicago, and supplied by THE FOUNDRY, Cleveland, for $5.00, and in London by the Penton Publishing Co. Ltd., 416-417 Caxton House, Westminster.

As its name indicates, this volume deals with various operations in the machine shop, and is designed to aid the apprentice in securing a good working knowledge of his trade more rapidly than otherwise could be accomplished. The book is divided into twelve sections. The first discusses measuring tools, their care and use. The second section is devoted to bench work, while the third section describes methods of laying out work for various types of machine tools. The next nine sections are devoted to descriptions of specific operations carried out on such machine tools as the drill press, lathe, shaper, planer, horizontal boring mill, vertical boring mill, the slotter, and the milling machine. The final section of the book is devoted to floor work. Numerous illustrations, and explanatory text matter make the book easily understandable.

Dust Control Group Elects Officers

Dust Control Equipment association, 1213 West Third street, Cleveland, recently elected the following officers at a meeting held in the Carter hotel, Cleveland, according to Arthur J. Tuscany, executive secretary and treasurer: Chairman, John Hellstrom, vice president, American Air Filter Co., Louisville; vice president, S. S. Parsons, Parsons Engineering Corp., Cleveland. Mr. Tuscany continues as executive secretary and treasurer.

Progress is reported in the organization's program underway for some time looking toward developing standards of dust control practice which will be of material help to the purchaser as well as the manufacturer of dust control equipment. In this work, the association is cooperating with the hygiene codes committee of the American Foundrymen's association, committee Z-9 of the American Standards association, dealing with the fundamentals relating to the design and operation of exhaust systems, and also with the Air Hygiene foundation in the work it may do in that direction.

Membership in the association is comprised of the following companies: American Air Filter Co., Louisville; American Foundry Equipment Co., Mishawaka, Ind.; Parsons Engineering Corp., Cleveland; W. W. Sly Mfg. Co., Cleveland; Claude B. Schneible Co., Chicago; and Whiting Corp., Harvey, Ill.

CLASSIFICATION	TENSILE	YIELD POINT	TRANSVERSE	DEFLECTION	BRINELL	COMPRESSION	IMPACT	MOD OF ELAS
A METAL AS CAST	50000 TO 65000	45000 TO 60000	5500 TO 6500	.250 TO .270	207 TO 227	165000	4 9	21 000 000
A HEAT TREATED AND DRAWN TO MACHINABLE HARDNESS	70000 TO 80000	60000 TO 70000	6000 TO 7000	.200 TO .250	290 TO 310	237000	11 0	25 000 000
A METAL HEAT TREATED	70000 TO 80000	60000 TO 70000	6000 TO 7000	ACCORDING TO DRAW	290 TO 450	232000	ACCORDING TO DRAW UP TO 11 FT LBS	25 000 000
A METAL ALLOYED	DEPENDS ON ALLOYING	ALLOYED WITH NICKEL CHROMIUM MANGANESE MOLYBDENUM OR COPPER FOR SOME SERVICE CONDITIONS RECOMENDATIONS ARE MADE FROM RESEARCH AND SERVICE RESULTS						
D METAL	30000 TO 40000	25000 TO 35000	4000 TO 4200	200 TO .220	160 TO 187	126000 126000	1 3	12 000 000

Fig. 17—Chart showing physical properties of metal as cast, heat treated and alloyed

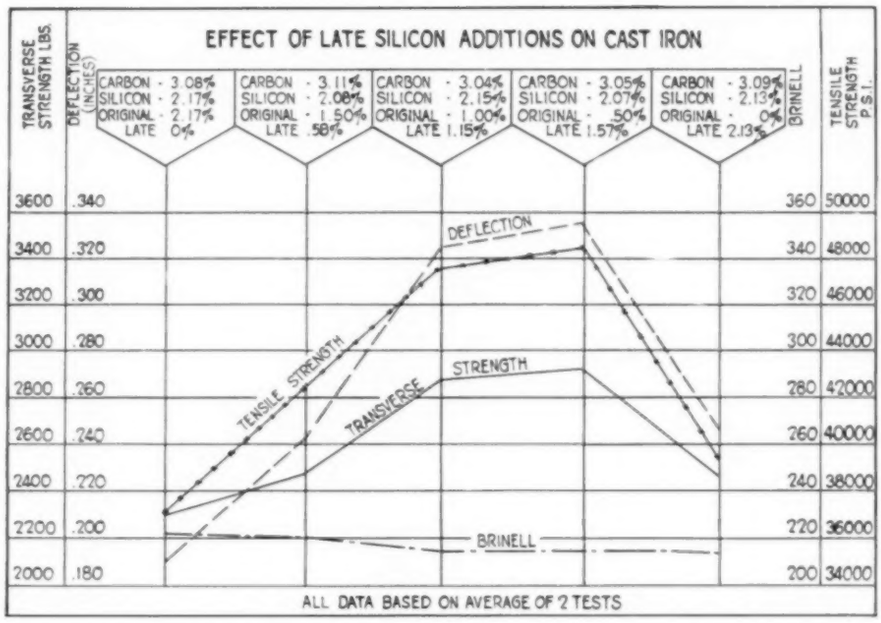


Fig. 11 — Effect on strength, deflection and hardness of late silicon additions on cast iron

Late Silicon Additions

(*Concluded from page* 29)

ties was observed. The uniform distribution of graphite should be noted.

With approximately three-fourths of the silicon added as a late addition, heat No. 1236, Figs. 7 and 8, the highest physical property values were obtained. The unetched plate shows little change in graphite formation and dispersion from the previous heat. Neither are physical properties appreciably altered. Possibly, the advantage to be gained by adding more than half the silicon as a late addition is not great.

In this particular series of tests, nearly all of the gain in physical property values brought about by late additions of silicon was lost when all silicon was included as a late addition. Transverse, deflection and tensile values immediately dropped to about the same level as when all silicon was included in the charge.

The following conclusions have been drawn from the data from these facts:

1. Silicon additions are made to best advantage in cast iron containing 3 per cent carbon, 0.90 per cent manganese and 2 per cent silicon by adding from 50 to 75 per cent of the total silicon as a late addition.

2. Deflection increases as the proportion of silicon increases up to 75 per cent of the total silicon. Where all the silicon was added late, however, a wild heat resulted. Evidently, there was not sufficient time elapsed to permit thorough deoxidation, a phenomenon which is apparently desirable if high deflection values are to be obtained.

3. Where irons are inclined to solidify and come down in a decided dendritic pattern, late additions of silicon are particularly effective in eliminating such dendritic formations.

4. The tensile strength of cast irons of this particular analysis may be increased as much as 12,000 pounds per square inch by adding a part of the silicon content as a late addition rather than incorporating all silicon with the charge or adding it entirely as a late addition. It is conceivable that gray irons of other compositions will behave in a similar manner.

We have observed how cast iron responds with improved property values as a result of refinements in foundry technique. An alternative method for producing better properties in cast iron is, of course, through alloy additions. To obtain the ultimate deflection, tensile and transverse values in cast iron, the best foundry technique, particularly with respect to silicon, should be employed, as well as proper alloy additions.

Martindale Electric Co., Cleveland, has purchased the Hergi Mfg. Co., Bridgeport, Conn., and will move the equipment to Cleveland, where manufacture of the same line of motor driven, flexible shaft equipment, steel rotary files, and rasps and burrs will be continued.

Book Review

Alloys of Iron and Chromium, Vol, I, Low-Chromium, by A. B. Kinzel and Walter Crafts, cloth, 535 pages, 6 x 9 inches, published for the Engineering Foundation by McGraw-Hill Book Co. Inc., New York, and supplied by THE FOUNDRY, Cleveland, for $6, and in Europe by the Penton Publishing Co. Ltd., London.

This volume is another in the series of monographs being prepared by the iron alloys committee of the Engineering Foundation, and as its title indicates, is devoted to the low-chromium alloys of iron and chromium. A second volume in preparation will cover the high-chromium alloys. The present volume is a review and summary of published information and available unpublished data on iron-chromium alloys, iron-chromium-carbon alloys, and the properties of steels and cast irons containing less than 10 per cent chromium.

The subject matter is divided into 13 chapters of which the first gives the history of chromium steels, preparation and properties of chromium metal, and properties and manufacture of ferrochromium. Chapter II discusses the constitution of iron-chromium alloys while Chapter III describes the iron-chromium-carbon system. Transformations in chromium steels, general effects of chromium in iron and steel, and manufacture and heat treatment of plain low-chromium engineering steels are the subjects of Chapters IV, V, and VI.

Chapter VII is devoted to properties of plain low-chromium engineering steels and Chapter VIII relates the low-chromium engineering steels containing manganese, silicon, nickel or copper. Chapter IX describes low-chromium engineering steels containing molybdenum, vanadium or tungsten while Chapter X covers chromium tool steels containing less than 3.5 per cent chromium. Special purpose low-chromium steels containing up to 3.5 per cent chromium, low-chromium cast iron, and chromium engineering steels containing 4 to 10 per cent chromium are subjects of the remaining three chapters.

Publishes Guide

Elliott Service Co., 219 East Forty-fourth street, New York, recently has published an interesting short book on "How To Handle Grievances." This little book, written by Glenn Gardiner, is designed to provide guidance to those dealing with employes. The text presents fundamental principles which have been found effective in various instances. The data applies for either a large or small organization.

Exhausts Control Dust

(*Concluded from page* 32)

falling sand entering the bin and will carry with it some of the fine dust when it escapes through the vent. Where exhaust is provided for sand screens located in bin enclosure, no additional vent will be required.

Bins should be dust-tight and provided with a tight cover over the top. The bin top, although frequently overlooked, is essential to dust control. The exhaust connection should be made as far from the feed point as possible to entrain the least amount of sand. Dampers should be located in the branches to regulate the exhaust volume to a minimum necessary for effective dust control.

For effective dust control at mixers or mullers, an enclosure, frequently referred to as a dust hood, must be provided to confine the dust and remove a minimum amount of clay, sand, or sea coal added at this point. The dust hood usually is cylindrical in shape and attached to the mixer frame. Provision must be made to feed the sand and other materials through enclosed chutes from bins, whenever possible. Necessary feed openings must be kept as small as possible, and tight. Access doors will provide inspection and working openings. The hood can be split for removal in making replacements or repairs.

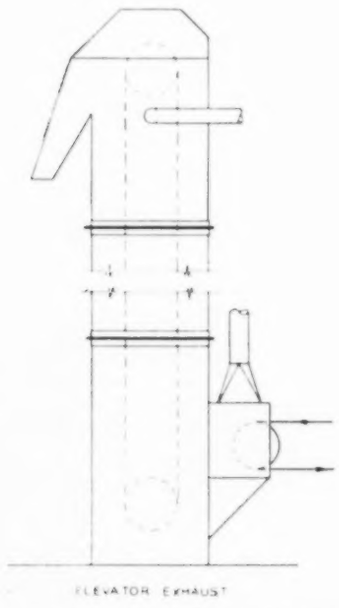


Fig. 7—Exhaust hoods may be located either at the head or the boot

The branch should be connected to the top of the hood as far from feed points or working openings as possible. A gradual transition connection should be provided to the branch connection to reduce the entering air velocity. Two or more smaller branch connections spaced some distance apart are even more effective. Recommended exhaust volumes are shown in Table V.

These points include the more usual sources of dust generation resulting from sand handling and conditioning. As mentioned previously, the other major operations requiring effective dust control are in the cleaning operation where the castings are tumbled, blasted and ground.

Use Washed Air in Iron Foundry

Ferro Machine & Foundry Co., Cleveland recently installed an air cooling system in the foundry for the comfort of the employes, particularly during the hot summer months. Based on observation during the period the system has been in operation it is expected that the increase in efficiency of operation will pay for the installation in one season, according to a recent article by H. B. Myers in *Electrical Production*.

Washed air is circulated around molding machine operators, molders, core setters and shakeout men on one of the conveyor lines and has proved highly satisfactory. The installation is comparatively simple. A water pump located outside the foundry building, circulates 18 gallons of water per minute through a battery of 8 spray nozzles. These form a water curtain over the air intake. A 15-horsepower motor drives a fan at 895 revolutions per minute and circulates 11,000 cubic feet of air per minute through the system.

After air has been drawn through the water curtain it passes through an eliminator consisting of a series of vertical fins. Free water particles are deposited on these fins and run to the bottom, leaving the washed air to be drawn on through the fan which forces it into a large round duct leading to the foundry. There it is distributed through 10 branches which lead off the main duct. Air is discharged through the branch ducts directly on the sides of hoppers above the molding machines. These hoppers act as baffles and thus widen the path of the air currents.

In the air washer, a float valve permits fresh water to flow into the system as it is needed to replace water lost through evaporation. A filter prevents large objects from clogging up the circulatory system.

This air washing system is of special value in the machine molding department where operators make and pour the castings. After a jolting operation the mold consisting of the drag or lower part, the core and cope or upper section is placed on an endless conveyor and carried along to the pouring station. When the molds pass the operators on the opposite side they are taken in hand by the shakeout men.

Heat radiating from the casings makes this department one of the hottest in the plant.

Air previously had been circulated by the use of individual blowers focussed directly on the men. Recently the idea was conceived to adapt the washed air system which had been in use for cleaning air for the compressors.

Experience has shown that air which for example has passed through water at a temperature of 60 degrees Fahr., will leave the ducts at a temperature of 62 degrees Fahr. Apparently the temperature has been increased by only 2 degrees. Improvement has been noted in the efficiency of the operators in this department, largely due to their greater comfort. It is felt that circulation of washed air is an important step in improving working conditions and efficiency in the foundry. Experience up to the present also seems to indicate that the increased efficiency will pay for the installation in a few months.

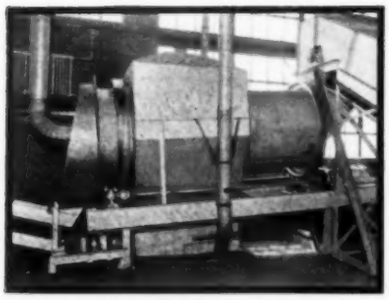
Book Review

A Prelude to Chemistry, by John Read, cloth, 328 pages, published by the MacMillan Co., New York, and supplied by THE FOUNDRY, Cleveland, for $5 and in Europe by the Penton Publishing Co. Ltd., London.

A most interesting discussion of the beginnings and the early history of chemical science is presented in this volume. Early in the volume the true meaning of alchemy in its broader sense is discussed. The author points out that it is a science of vast implications, a system of research possessing innumerable absorbingly interesting links with other fields of thought. The learned sages of alchemy handed down the torch of natural knowledge for more than 1500 years.

The reader cannot help but marvel at the many and romantic figures which flitted across the alchemical stage in the course of its 15 centuries or more of existence. It is a close glimpse of these characters and their work which makes this book exceedingly interesting and readable. More than 100 rare and amusing illustrations add to the pleasures of the text.

The Bartlett-Snow Continuous Mold Conveyor Cuts Space and Flask Requirements



BARTLETT-SNOW REVOLVING SCREENS . . . dust tight . . . for overhead or floor mounting. Standard sizes to meet any requirement.

BULLETIN No. 75. Complete with 120 illustrations and 26 engineering diagrams, this 44 page booklet describes the Bartlett-Snow method of securing less costly; more efficient operation. Send for one!

● Bartlett-Snow continuous mold conveyors enable owners and plant managers to secure a maximum of both quantity and quality from their plants . . . with a minimum of floor space and a minimum of flask equipment. They permit sand to be reused four, or even more times a day . . . flask equipment from eight to ten times each shift.

Three standard types with car tops ranging in size from 18" x 42" to 6'0" x 10'0" and many special types of Bartlett-Snow continuous mold conveyors, meet every requirement for handling small, medium or large sized flasks. Let us show you the savings that other foundries are securing with Bartlett-Snow mold conveyors, aerators, pug mills, castings coolers, conveyors, elevators, flask fillers, etc. . . . and the savings they can make for you. The investment in equipment need not be large. What are your foundry problems?

THE C. O. BARTLETT & SNOW COMPANY

In New York: 30 Church Street

6201 Harvard Ave. Cleveland, Ohio

In Chicago: First Nat'l Bank Bldg.

BARTLETT·SNOW

SAND HANDLING AND SAND CONDITIONING EQUIPMENT
MOLD CONVEYORS AND ACCESSORY FOUNDRY EQUIPMENT

Control Sand Properties

(*Continued from page* 34)

upon a strong sand core may result in a crack due to the strains created and the low tensile properties of the iron at high temperatures. This is also noticeable in castings which vary considerably in cross section. Here we have even a greater tendency to crack because of the strains resulting from the differential cooling of the sections.

Very often high dry strength is necessary particularly to reduce scrap in the manufacture of hydraulic castings to prevent the iron from washing the sand from any part of the mold.

How often are these tests to be made? This question requires a different answer for every foundry. In jobbing foundries, permeability and strength tests of sand heaps are made on an average of once a day, and dry strength once a month. In mechanical foundries these tests should be made every time the sand is cut over. After all the answer is to make sufficient tests to keep in touch with the condition of the sand heap. Make no more and no less.

Sand in the mold is the real test of its fitness and one of the first steps to be considered in mold control is the relation between mold hardness and the controlling sand properties. Mold hardness refers to softness or hardness of rammed sand at the mold cavity and can be determined by measuring the penetration of a ball under a standard load.

Practical application of mold hardness control is obvious. A soft mold resulting in overweight castings, swells, and strains may be caused by an increase of moisture or fineness, or a decrease of strength. A hard mold under standard ramming conditions may be caused by an increase in strength or a decrease in moisture and fineness and its most common defects are blows and scabs.

Results of mold hardness tests have shown that the sand may be in an excellent condition, yet if ramming practice or mold hardness varies to any considerable extent, defective castings will be produced. On the other hand with ramming practice standardized, variations in hardness will indicate that the condition of the sand is not satisfactory.

When sand changes its shape under a load or a pressure it is said to deform. Now the deformation of sand and the test for deformation have been known for a long time but found little practical value in the past. However, Harry W. Dietert recently has used this property in combination with the compressive strength to determine the resilience or the modulus of compression of the sand. The result gives practical information on the load carrying ability of the sand and is calculated by taking the deformation and multiplying it by the compressive strength. It is that property which the older school of foundrymen feel when they say that a sand is short or brittle.

Deformation when used in combination with strength has a definite and practical value. One sand may have a higher compressive strength than another yet it will fail in the foundry because it is unable to deform sufficiently. It is this property which prevents drops if the flask distorts slightly when lifted; it is this property which gives flexibility to the sand and allows it to receive considerable core print pressure without failure.

It will allow pattern plates to be constructed so that considerable green sand crush may be carried at the parting line thereby eliminating fins. It may be described as the ability of sand to stand abuse in the foundry. On the other hand, if the deformation of the sand is too great it allows the metal to swell the mold, resulting in opening the mold at the parting line and causing run-outs.

Moisture Control Important

Deformation of molding sand may be controlled most effectively by controlling the moisture, since this changes it more than any other property. An increase in moisture will increase deformation and increase the modulus of compression and the ability of the sand to deform. Use of excess bond over that necessary to coat the grains will result in high deformation and the selection of raw bonding materials may be a practical solution to the control of this property.

To maintain a high quality product, to maintain the efficiency of the sand handling machinery at a maximum, and the cost of production at a minimum, it is necessary that certain fundamental policies must be laid down by the management. After suitable testing apparatus has been installed results from sand control have been found best in those foundries where the supervision is given by a man who has had some technical training as well as some practical experience as a molder. In many foundries all additions of new sand or clay, the tempering and cutting of sand are personally handled or directed by this man.

The tests may be made by a boy and the sand may be added and cut by common labor but the interpretation of test data and the decision as to what materials are to be added and in what quantity should be made by a man of experience and training. This individual should be under direct supervision of the foundry manager with the technical department acting in a consulting capacity.

In jobbing foundries the supervision of the testing and the interpretation of the results may be accomplished by the general foreman after consulting with the manager. In any case it is essential that responsibility for the tests and the condition of the heaps must be centralized.

Figures obtained from sand testing are of no value unless we correlate them with the losses. In this way the physical properties that produced the best results should be made a routine matter. Some foundries plot daily curves of permeability, strength and moisture against scrap losses caused by sand, such as blows, scabby castings, cuts, drops, sand-hole, etc. This method has helped to reduce scrap losses because it classifies the loss and places it in a position where action may be taken for its correction.

Test Results Show Variation

Experience with the A. F. A. tests have been varied. In the majority of cases they have resulted in the uniform shipment of sand on the part of the producers, lower defective castings, sand conservation and reclamation and an improvement in the surface finish of the casting produced. In other cases sand testing has failed to accomplish these results due in a large measure to the lack of information as to what the test means.

Benefits of scientific sand control come in part from better sand, better molding properties and better molds. When sand varies widely in properties from day to day, when these changes and the resulting casting losses cannot be understood workmen become careless. Sand then is a possible alibi for careless and dirty molding.

Experience tends to indicate that gating design is responsible for many of the ills laid to sand or metallurgical features. However, careful control of foundry sand properties if properly managed will result in lower sand cost, fewer losses and improved casting surfaces.

An examination of some sands, particularly fine sands which have been used considerably, shows rounded or balled particles which are larger in size than the original grains. This balling action of the sand may be described as the formation of hard rounded pellets of fine sand and clay. These pellets naturally increase the essential

(*Concluded on page* 79)

(*Concluded from page* 76)

grain size of the sand and produce the same effect as a coarse grained sand.

Sand which is moistened and is allowed to remain this way for at least several hours before mixing, which allows the moisture to distribute somewhat as in floor molding, will ball up very slowly. Generally it is known that sand becomes coarser through handling and this effect is of much greater magnitude with mechanical handling.

From observations in the foundry we have found that the balling effect of sand is due to the movement of the sand containing a critical moisture content with an uneven distribution of moisture, and that the balling effect is increased by an excessive quantity of clay in the heaps. A badly balled sand is always a source of trouble in the foundry, but may be counteracted by the addition of a fine sand, a sand of a lower clay content, mulling, improvements in mechanical handling or a combination of these.

Foundries located close to the source of satisfactory molding sand and where the problems of spent sand disposal are unknown may not be particularly interested in the use of clay bond. However, most foundries are not fortunate enough to be classed in this group.

Sand reclamation has been tried for many years but generally met with little success, especially where a high grade surface was required. This was due principally to the lack of methods for measuring the physical properties of sand. It has been observed that with the intelligent use of sand testing apparatus, the sand is used more efficiently and this has gradually led to the reclamation of sand formerly classified as waste sand and to the manufacture of synthetic sand. However, it must be remembered that the reclamation of waste sand was not brought about over night but has resulted from gradual accomplishments over a long period.

Presents Standards Of Refractories

American Society for Testing Materials recently has published the 1937 Manual of A.S.T.M. Standards on Refractory Materials, which gives, in the latest form, all of the specifications, test methods, and definitions in the field, as developed by committee C-8 on refractories. In addition, detailed methods for interpretation of refractory test data are included. Information also shows service conditions.

Copies of the 108-page book may be obtained from the A.S.T.M., 260 South Broad street, Philadelphia, for $1.25 each.

Vulcan Stands on Red Mountain

Gigantic statue of Vulcan, great iron working god of mythology, recently has been placed in a commanding position on top of Red Mountain overlooking Birmingham, Ala., a fitting symbol of the greatest industrial city in the South and of an industry which revolves around iron and steel. The statue is cast iron 56 feet high and weighs 70 tons. It stands on a pedestal nearly 200 feet high constructed of reinforced concrete and native sandstone.

The statue is the central figure in a beautiful mountain top park. Part of the base contains a natural history museum. An inside stairway leads from the ground floor to a lookout gallery near the top on the outside and serves as a vantage point for visitors in viewing the city spread out in the valley and on the hills on both sides. Several lagoons with concealed lighting systems illuminate the statue at night.

Originally designed and erected as a center piece for the Alabama exhibit at the Louisiana Purchase exposition, held in St. Louis in 1904, the statue, once the subject of extensive newspaper comment, gradually passed into partial obscurity. For a time it occupied space near the center of the city and then was moved to a point near the entrance of the state fair grounds. The latest move to a commanding position above the city was carried out through a movement initiated by the Kiwanis club of Birmingham. The city of Birmingham and the Works Progress Administration cooperated to build the park and monument. The Federal agency provided $44,085 and a corps of relief workers.

Statue of Vulcan as it stands on 200 foot pedestal on top of Red Mountain

Vulcan was designed and modeled by G. Moretti, famous Italian sculptor. The huge figure in sections was molded and cast in one of the Birmingham foundries and constitutes a remarkable tribute to the ingenuity and high technical skill of the molders whose names modestly appear on the under side of the one of the castings: T. Wheeler, G. Cass, O. Greener, L. Plant, S. Akin and D. Green. Funds for the construction of the statue were raised by popular subscription.

Book Review

The Open-Hearth Furnace, Vol. II, by William C. Buell Jr., cloth, 260 pages, 6 by 9 inches, published by the Penton Publishing Co., Cleveland, and supplied by THE FOUNDRY, Cleveland, for $4.00, and in Europe by the Penton Publishing Company Ltd., London.

This volume is the second of three dealing with various phases of the open-hearth furnace. The first which was reviewed previously, was concerned with the design and construction of the physical component of the furnace structure, the correct use of the materials of engineering now available for such use, and the heat transfer through refractory. The present volume deals chiefly with the design and development of the inner contour of the structure necessary so that the thermal and flow effect will best conclude the covering function of the open-hearth furnace which is the production of satisfactory steel, at lowest cost.

The book is divided into 12 chapters relating to such phases as critical areas, metallurgical factors affecting furnace design, temperatures, fuel rates and fluid flow, quantitative heat distribution and heat valves, and flow diagrams—their development and use.

Remaining chapters relate to the bath of metal-rating and development, heat transfer to the open-hearth bath, refractories for open-hearth furnace ends and throats, layout of open-hearth furnace ends, design of open-earth furnace throats, and steel binding for open-hearth furnace ends. Numerous tables and illustrations are presented to amplify the text matter, and a good cross index aids the reader in locating specific references.

Foundry On Fourth Floor

(*Concluded from page* 35)

the principal products poured. Some aluminum castings also are made. Output is about 100 tons monthly.

Seven, oil-fired crucible furnaces are located on the opposite side of the floor from the molders. An exhaust fan with capacity of 18,000 cubic feet per minute removes furnace fumes. Grinding wheels, tumbling barrel and sandblast also are equipped with exhausters.

Molding and pouring are done with a minimum of manual handling of sand and metal. Machine molders are placed along a large bay of windows, each being provided gravity-roll conveyors on which the molds are placed for pouring. Hot metal is delivered from the furnaces to the molds by cranes moving over monorails. Floor molding is done at the end of the machine molding line.

An important factor in speeding up molding operations has been the installation of a mechanical sand handling system. Eliminating the floor heap also has contributed to a cleaner atmosphere. In the present setup, a central unit prepares the sand for delivery to overhead storage hoppers. Individual hoppers are provided each molder. From the shakeout at the end of each roll conveyor the sand is returned automatically to a vibrating screen for the removal of refuse. Reclaimed sand then passes to a storage bin and later is discharged to the mixer for further reconditioning before being returned again to the molding hoppers.

Book Review

Magnesium Alloys (Magnesium-Legierungen), by A. Gruetzner, paper, 192 pages, 6¾ x 10 inches, published by Verlag Chemie, Berlin, Germany, and available through THE FOUNDRY, Cleveland, and in Europe by the Penton Publishing Co. Ltd., London.

This volume, which is written in German, presents detailed information on patents relating to magnesium alloys from 1909 to December, 1936, inclusive which are recorded in the German, English, French, Austrian, Swiss and United States patent offices. In the compilation of the patents Dr. Gruetzner was aided by G. Apel and C. Goetze of the German Patent office, and the Volume itself constitutes a section of *Gmelin's Handbuch der Anorganischen Chemie*, various sections of which have been reviewed from time to time.

Data presented in the book is arranged in three columns of which the first gives the composition, the second gives properties, applications and claims, and the third gives the name of the patentee and patent number. Listing of the various alloys is alphabetical according to the element or elements added to magnesium, beginning with silver (Ag), and ending with zinc (Zn). While written in German, little difficulty should be encountered in determining the correct meaning.

Publishes Standards

Heat Exchange institute, 90 West street, New York, has published a booklet entitled "Standards of the Tubular Exchanger Section," which covers mechanical, construction and thermal standards for shell and bare tube heat exchangers. The standards contain data on exchanger shells, tube sheets, baffles, support plates, tubes, material specifications, fouling factors and thermal design. Copies may be secured from C. H. Rohrback, secretary, for 75 cents each.

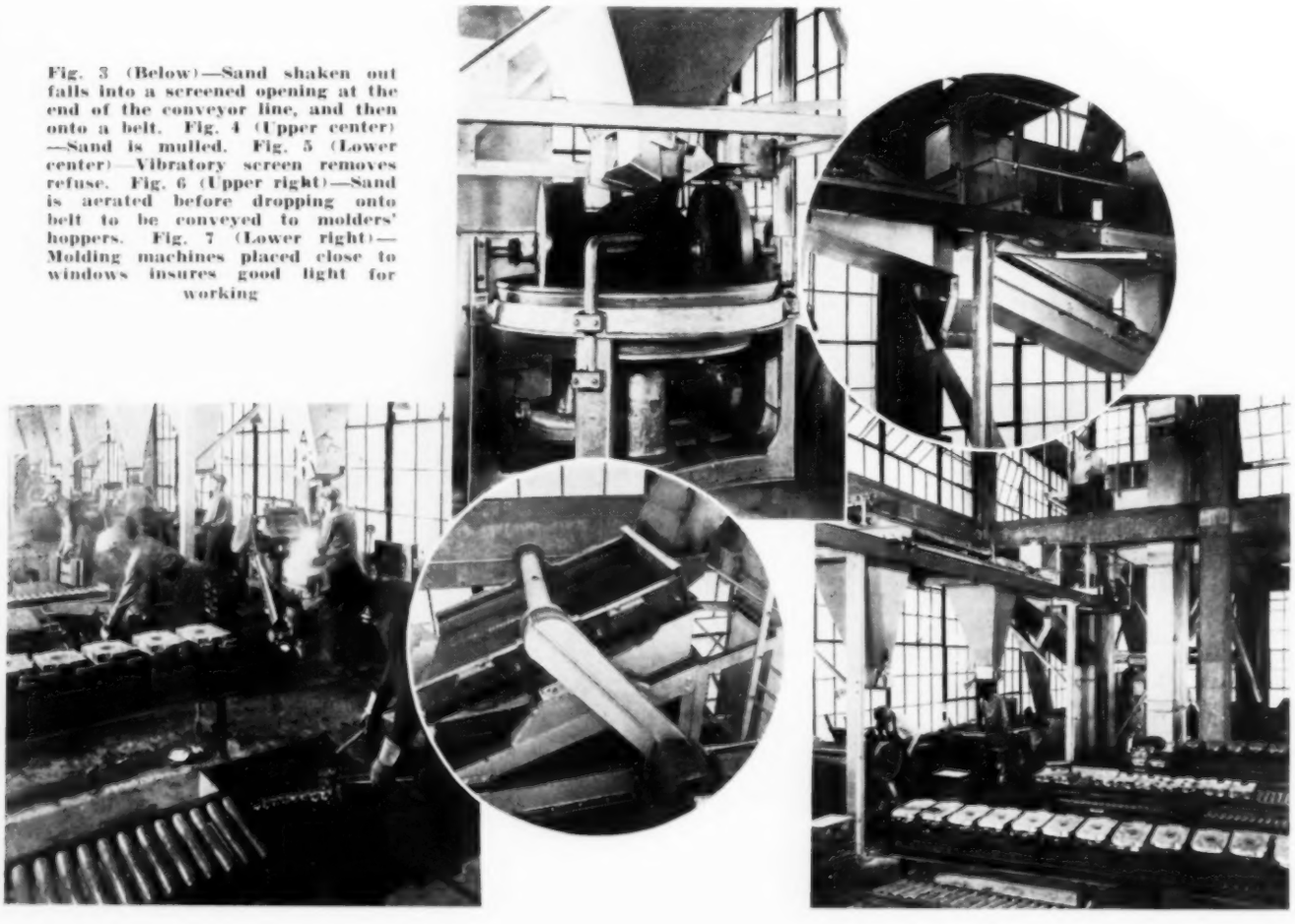
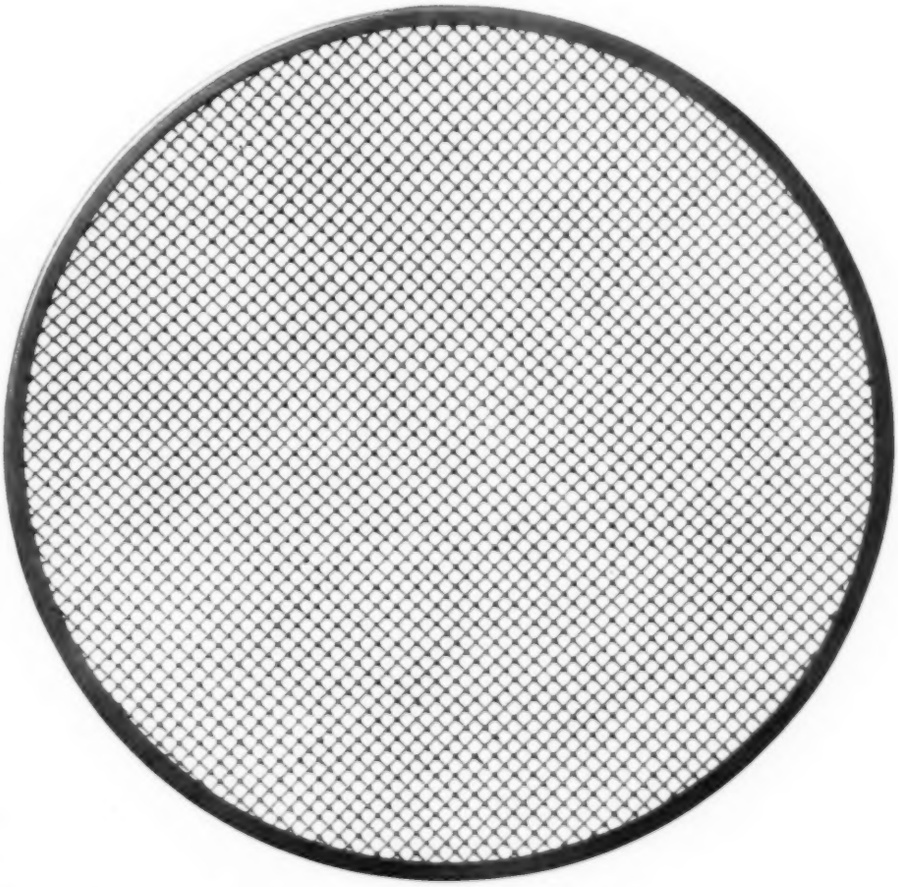


Fig. 3 (Below)—Sand shaken out falls into a screened opening at the end of the conveyor line, and then onto a belt. Fig. 4 (Upper center)—Sand is mulled. Fig. 5 (Lower center)—Vibratory screen removes refuse. Fig. 6 (Upper right)—Sand is aerated before dropping onto belt to be conveyed to molders' hoppers. Fig. 7 (Lower right)—Molding machines placed close to windows insures good light for working

Foundry Supplies Mfg. Co.

NEW *QUICK CHANGE* SIEVES



★ *Clear Sifting Area— 20 Inch Diameter*

For Use with the New and Improved UNIVERSAL "*Free Wheeling*" RIDDLE

The Finest Foundry Sieve Made

Instantly, Easily Interchangeable
Much Larger Sifting Capacity

Built with a Smooth, One-Piece, All-Steel Rim
No Rough Edges to tear workers' hands
No Adjusting in changing from one mesh sieve to another—all sieves one size

No Waste Space, No Storage Problem
"You can stack them just like playing cards"

Sold by Leading Foundry Supply Houses

Ten Days Free Trial

Nos. 2 to 6 Mesh **$1.35 Each** f. o. b. Chicago

FOUNDRY SUPPLIES MANUFACTURING CO.
2221 Orchard St., Chicago, Ill.
Tel. Diversey 5453

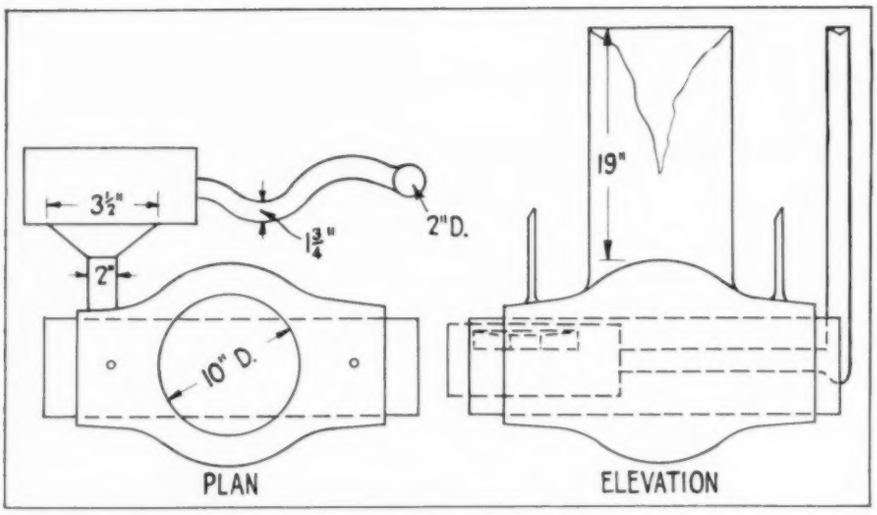


Fig. 2—Method of gating and risering a 400-pound silicon bronze casting according to Roast. The riser in this case weighed as much as the casting

Gating Nonferrous Castings

(*Continued from page* 36)

above the top of the sprue so that none of the floating scum or dross in the pouring basin will be sucked down into the casting.

Where plugs are used with a pouring basin, it is desirable to have the holes into which the plugs are inserted made of some material that will resist abrasion. This will prevent development of dirt or dust that later may be washed into the mold cavity. In some foundries a cast iron plate with a suitable opening forms the top of the sprue.

A cast iron plug is inserted in the opening. This has worked very well where proper precautions have been taken to prevent the metal from bubbling on the cast iron, which may be wet from condensed moisture. Graphite may be substituted for the iron plate with graphite or cast iron plugs.

Irrespective of the material employed the most important feature is to insure absolute cleanliness and freedom from all opportunity of causing dirt to be carried into the mold with the inflowing metal. Obviously when the plugs are pulled and the metal rushes down the sprue, any loose particles in the path will be carried with the stream and will produce defective spots where they lodge.

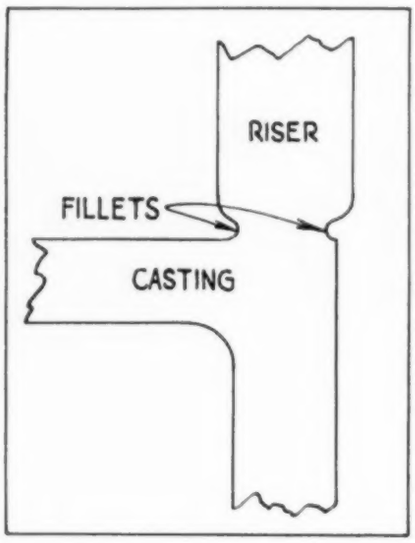


Fig. 3—Generous fillets where riser is attached to casting eliminates sharp edges and facilitate removal

Use Round Risers

As a general rule it is best to have risers round rather than square. Square risers expose a larger surface in proportion to the volume of metal therein. The larger surface means a more rapid transference of heat from the riser to the sand, thereby cooling the riser faster, the opposite of the more than desirable condition. The riser should cool as slowly as possible. Metal in the riser should remain molten as long as and a little longer than the time during which the casting demands feeding.

Height of a riser should be given careful thought. Necessary static force or weight of metal above the point to be fed by the riser should be sufficient to insure flow of metal from riser to casting. Some of the alloys with which we are dealing cool relatively slowly and set rather progressively. In many instances the riser may need hot metal additions some time after the casting has been poured, particularly large castings with very large risers.

The risers will shrink down and need more metal. Some times 30 or 45 minutes or even longer after the casting has been poured additional metal should be added to the riser to insure the necessary pressure, and to insure maintainance of the fluidity of the metal within the riser.

Chills may be cast iron, copper, brass or bronze, whichever is desirable from several standpoints that arise in the different castings. Designers give too little thought to the foundryman's problem of making the casting. They confine their attention to designing a casting that will machine rapidly and thus reduce machining costs.

The foundryman constantly is confronted with new problems of making good castings of difficult design. Frequently castings are so designed that certain points are almost impossible to feed by risers if all other points are properly fed. Consequently these sections must be cooled by chills so that they will cool with the proper proportional speed of the metal around them. In these cases chills become imperative.

Chills Are Irregular

Frequently these chills are of such irregular shape that they must be specially made. A simple method is to place a sufficient quantity of soft plaster of Paris on the desired location on the pattern. After the plaster has hardened it is carefully pared down to the proper thickness so that it has a minimum thickness and yet does give sufficient chill. It is then used as a chill pattern.

In many instances nails are stuck part way into the plaster paris. They stand out and later become anchors in the sand to hold the chills in place. Certain chills may be provided with a number of holes through which the molding sand comes in contact with the pattern and thus allows gas to escape through the green sand of the mold. Too much chill might make a mold too tight at this point.

Chilling should be done sparingly and with a great deal of careful study. The desirability of feeding the casting rather than chilling it cannot be emphasized too strongly. If the foundryman could examine the cross section of the casting under the microscope at the point where he has chilled it and compare it with the same point properly fed, he would see that it is much more desirable to feed a section of the casting than it is to chill it.

While gating is a most important factor in the production of good castings, surfacing of the mold is

(*Concluded on page* 85)

(*Concluded from page* 82)

another factor and is something that is not standardized. Each foundryman has his own preference and theories regarding surfacing of molds for the different kinds of alloys.

Many foundrymen surface the molds with lamp black by a torch with a smoky flame. For example, an acetylene flame without sufficient oxygen to completely burn the acetylene is used. Others sprinkle the mold with flour shaken from a bag. Back of these surfacings is the sand itself.

Proper fineness of sand influences the surface of the casting quite as much as do these surfacing materials. Sand should be riddled through the right size mesh to give the proper finish and should not be too wet. This has been discussed in a previous article but it is emphasized again since there are three major factors that influence the production of good castings, namely melting, molding and gating.

In the writer's opinion the most important step in insuring sound castings that will meet the demands put upon them by engineering service, is the proper melting of the metal. The importance of having good metal available for the molds that are produced cannot be stressed too strongly.

Good clean metal, poured into good molds through the proper size sprue and thence through runners and gates to well made molds, must result in good castings. Negligible foundry loss should be the invariable result.

If defects appear, each of the three steps should be analyzed carefully. Each defect should be studied to determine in which of the three the cause may be found and every step in the process of production should be considered. If all the different steps in the process of manufacture are perfect, only a perfect casting must result. Therefore, if an imperfect casting results, there must be some step in the process that has not been maintained up to par.

Book Review

Introduction to Ferromagnetism, by Francis Bitter, cloth, 307 pages, 6 x 9 inches, published by McGraw-Hill Book Co., New York, and supplied by THE FOUNDRY, Cleveland, for $4, and in Europe by the Penton Publishing Co. Ltd., London.

This book endeavors to provide the reader with an account of those aspects of ferromagnetism which give promise of having outstanding interest during the next few years, especially in applications to clear up some of the dark corners in the theory of metals. As the author points out there are three fundamental problems which confront the students of metals, and which may be approached by study of magnetic phenomena, especially in relation to ferromagnetic media. One is the preparation of materials of accurately known chemical composition as embodied in work by Dr. T. D. Yensen; another is the study of Zwicky's co-operative phenomena and the related structure-sensitive properties of metals which are so strikingly apparent in ferromagnetic materials, and the third is measuring the internal strains and grain orientations of metals.

The book is divided into nine chapters and an appendix of which the first forms a general introduction. Chapter II discusses historical development while Chapter III is concerned with metals and alloys. Magnetic materials and their preparation is the subject of Chapter IV which was prepared by Dr. Yensen, and Chapter V describes internal fields. Chapter VI relates to magnetization while Chapter VII discusses mechanical deformation. Chapters VIII and IX describe electrical phenomena and absorption and evolution of thermal energy. The appendix on co-operative phenomena by F. Zwicky concludes the book.

To Engage in Joint Research Program

Joint program of engineering and metallurgical research has been formulated by a group of aluminum cylinder head manufacturers, with the purpose of correlating progress in engine design and materials in relation to cylinder heads.

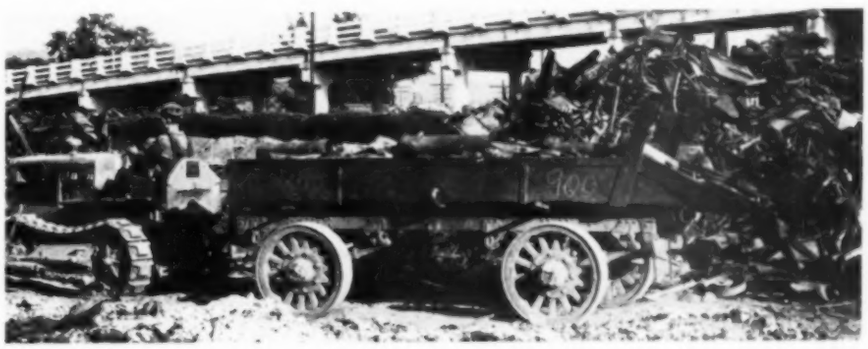
Laboratory work will be conducted on a co-operative basis by Aluminum Co. of America, Bohn Aluminum & Brass Corp., Aluminum Industries Inc., Advance Aluminum Castings Corp., National Bronze & Aluminum Foundry Co. and the Permold Co. Engineering phase of the program will be devoted to a study of the adaptation of thermal qualities of aluminum alloys to present and future engines; metallurgical phase will delve into problems connected with alloys used in cylinder heads, chemical and electrolytic reactions of cooling water in various sections of the country, advantages of various types of gasket materials and other data particularly concerned with circulating systems and cooling agents.

Establishes Group Of Scholarships

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has established a group of scholarships at Carnegie Institute of Technology, Pittsburgh, as a part of a co-operative engineering plan between the company and the college, according to Dr. Webster N. Jones, director, college of engineering at Tech. Scholarships are engineering, undergraduate in character, and are known as the George Westinghouse scholarships. Normally there are 50, of which 10 will be vacated each year upon graduation of the student. Each scholarship has a total value of $3000 payable monthly at the rate of $50 for the 5-year period of the course. The first 10 scholarships will go into effect on June 1, 1938.

Applications should be made to the manager of technical employment and training, Westinghouse Electric & Mfg. Co., Union Bank building, Pittsburgh.

Tractor Hauls Scrap and Castings



KILBY CAR & FOUNDRY CO., Anniston, Ala., employs a tractor to good advantage in its foundry operations. This illustration shows a tractor made by the Caterpillar Tractor Co., Peoria, Ill., hauling a trailer load of scrap iron from the yard to the cupola. It is said to operate on less than a gallon of fuel per hour. Busy 16 hours a day, the tractor hauls 245,600 pounds. It also is employed for hauling castings in the foundry.

OBITUARY

REUBEN E. APTEKAR, 37, assistant general superintendent of foundries, American Brake Shoe & Foundry Co., New York, died Dec. 4 after a brief illness. Mr. Aptekar was born on Dec. 25, 1900 and graduated from the University of Michigan, Ann Arbor, Mich. with a degree in chemical engineering. From 1922 to 1927 he was employed by the Ford Motor Co., and then became connected with the American Radiator Co. until 1930. He then acted as consulting foundry engineer for the Rusian government for 2 years, later returning to this country where he established his own foundry consulting business. He became connected with the American Brake Shoe & Foundry Co. in April, 1935.

Mr. Aptekar was well known in the foundry industry for his many contributions to progress in foundry practice. He had served on the sand committee of the American Foundrymen's association and was the author of numerous technical papers and articles, some of which have been published in THE FOUNDRY.

♦ ♦ ♦

Bernard Neacy, 79, for many years an executive of the Filer & Stowell Co., Milwaukee, died Nov. 27.

♦ ♦ ♦

Ellis H. Morrell, purchasing agent, National Radiator Corp., Johnstown, Pa., died Dec. 5.

♦ ♦ ♦

Archibald H. Coplan, president, Hull Iron & Steel Foundries Ltd., Ottawa, Ont., died Nov. 19.

♦ ♦ ♦

Henry L. Moyer, 63, a brass molder and former foundry owner, Allentown, Pa., died Dec. 7 from injuries suffered in a fall.

♦ ♦ ♦

Arthur Johnston, 73, associated with the International Harvester Co. for 42 years before his retirement in 1929, died Nov. 24 in Chicago. He had been head of the experimental department of the company.

♦ ♦ ♦

Frederick J. Bickel, 51, research engineer, Osborn Mfg. Co., died suddenly on Dec. 27. Mr. Bickel was born in Monroeville, O., and had been an employe of the Osborn company for the past 24 years.

♦ ♦ ♦

Frank B. Black, 72, chairman of the board, Ohio Brass Co., Mansfield, O., died at his home recently. Mr. Black founded the company in 1888 and had watched the company become one of Mansfield's leading enterprises with large subsidiaries in the Ohio Insulator Co., Barberton, O. and the Canadian Ohio Brass Co., Niagara Falls, Ont.

♦ ♦ ♦

Rudolph Wintzer, 64, consulting engineer, Nordberg Mfg. Co., Milwaukee, died Dec. 16 in that city. Mr. Wintzer was born in Germany and received his mechanical engineering education there and in England. He came to America in 1907 and in 1912 became connected with the Nordberg organization.

♦ ♦ ♦

John W. Pohlman, president, Pohlman Foundry Co. Inc., Buffalo, died Dec. 15. Mr. Pohlman was a past secretary-treasurer of the Niagara Frontier chapter of the Gray Iron institute, now the Gray Iron Founders' society.

John W. Pohlman

♦ ♦ ♦

Thomas Bemis Sr., 75, Indianapolis, died Dec. 6 after a long illness. Mr. Bemis had been a resident of Indianapolis for 47 years. At one time he owned and operated the Taisey Pneumatic Service Co., the Superior Iron & Brass Foundry and the Anderson Steam Vulcanizer Co.

♦ ♦ ♦

Anton Hosek, 69, vice president of the Hosek Mfg. Co.-Overland foundry, Denver, died recently from a heart attack. Mr. Hosek was born in Brooklyn, N. Y., June 27, 1868 and went to Denver 18 years ago to join his oldest son, Henry, in the foundry business, which the latter organized.

Moves Office

Linde Air Products Co., unit of Union Carbide & Carbon Corp., has moved its Boston office to 441 Stuart street, Boston.

♦ ♦ ♦

Hull Industrial Supply Co., Toledo, has been appointed representative of the General Refractories Co., Philadelphia, in the Toledo district.

Foundry Show at Cleveland

(*Concluded from page 37*)

tickets. By opening on Saturday when foundries usually are not operating, the association is providing a splendid opportunity for every foundry employe in the vicinity of Cleveland to see probably the finest display of foundry equipment and supplies ever assembled.

Hotel reservations are being received by the housing committee in rather a steady volume. Those in charge of convention activities suggest the advisability of sending in reservations at once on the blank recently supplied all A.F.A. members by the association.

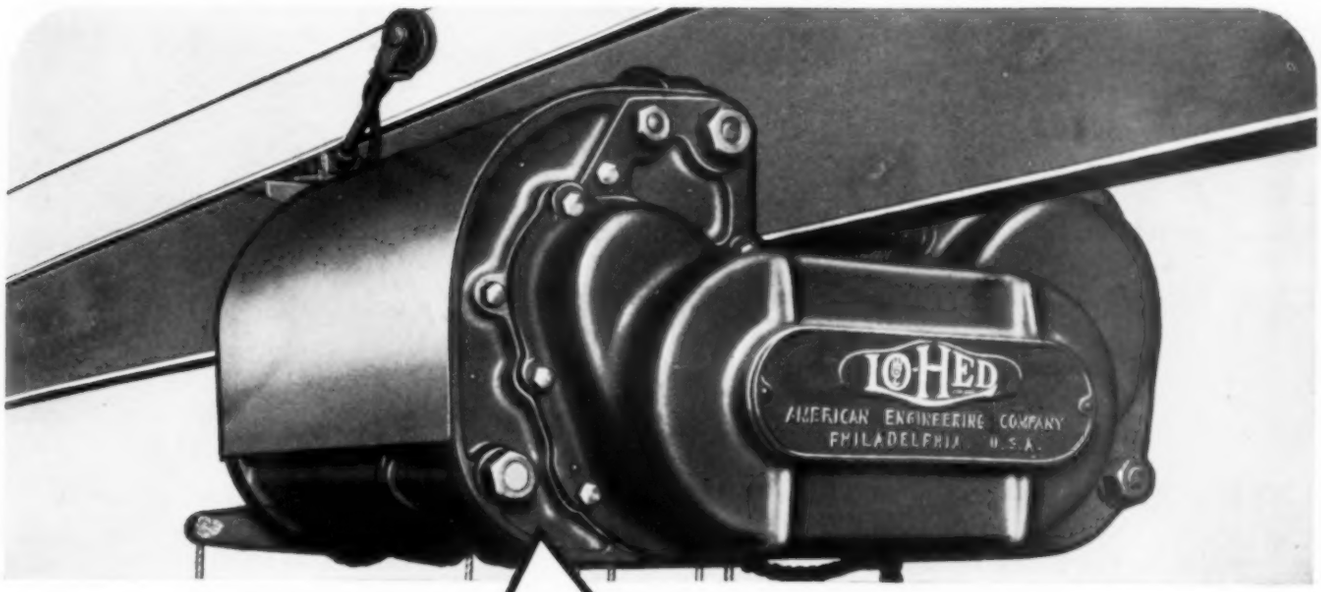
Book Review

High Temperature Welding Flames, by D. Seserian, cloth, 51 pages, 6 by 9⅝ inches, published by the Penton Publishing Co. Ltd., London, England, and supplied by THE FOUNDRY, Cleveland, for $1.00.

This volume has been translated from the French by N. F. Daniel, and contains a preface by M. G. Ribaud. As the title of the book indicates, it is concerned with the actual temperature of the various types of flames used in welding, and while the work is of a scientific nature, it gives much very practical information on flames used before welding.

The book is divided into three chapters of which the first deals with the specific heats of gases at high temperatures and discusses such phases as the classical theory, and the new theory of specific heats of gases. Chapter two discusses dissociation constants for flame constituents and describes calculation of dissociation fractions for diatomic gases, and triatomic gases. Chapter three relates to welding flames and gives detailed information on the oxyacetylene flame, the investigation of hydrogen flames including the atomic hydrogen flame, and the oxyhydrogen flame, the calculation of flame temperatures for other hydrocarbon including the oxygen-methane flame, and the oxygen-butane flame. A new method for the determination of flame temperatures and the oxyacetylene flame as a photometric standard.

Turbine Pump division, Roots-Connersville Blower Corp., Connersville, Ind. has appointed the Buffalo Mill Supply Co. Inc., 210 Main street, as distributors for turbine pumps in Buffalo and surrounding territory. F. W. Allen & Son, 2658 West Twenty-sixth street, Erie, Pa., has been named distributor in the Erie district.



A High Factor of Safety Here

Assures Safer Handling Here

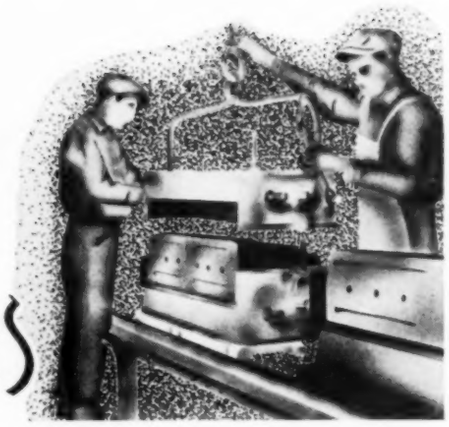
Specify *THE* hoist with the highest factor of safety! • Let the nearest A-E-CO representative show you why A-E-CO Lo-Hed HOISTS are the safest hoists built. • Ask him to explain Lo-Hed's exclusive features that mean constant, dependable performance and lower maintenance cost. • Let him show you Lo-Hed's uses in scores of industries. • Find out *why* Lo-Hed is the logical hoist for EVERY purpose and why it is the *only* hoist for low headroom conditions. A-E-CO Lo-Hed HOISTS are built in 98 standard models—from ¼ to 12 ton capacities.

Classified phone directories list the local A-E-CO representative in principal cities. Call him in . . . or write us for the new hoist catalog. This catalog clearly shows you how to select the specific hoist for your requirements. **American Engineering Company, 2418 Aramingo Avenue, Phila., Pa.**

A-E-CO Lo-Hed HOIST

AMERICAN ENGINEERING COMPANY

NEW EQUIPMENT for FOUNDRIES



Wire Straightener

Kane & Roach Inc., Syracuse, N. Y., recently has placed on the market an improved type core wire straightener, shown in the accompanying illustration. The machine is designed to handle wires and rods from ⅜ to ¾-inch diameter, but other types are available for handling smaller sizes. It is claimed that with a motor 7½ to 10 horsepower running at 1140 revolutions per minute the production is 100 to 125 feet per minute of reclaimed and straightened rod.

Operating mechanism is totally enclosed on machine designed to handle three sizes of wire

Frame of the machine is of box form construction with the top plate extending the full width of the frame. Roll shaft and reduction gearing are enclosed in cast iron oil tight gear box. The frame is mounted on a cabinet type base with a platform extending under the roll shafts the full length of the machine. Pinch roll shafts are supplied with rugged outboard bearings and are spring loaded to allow of slight variation in the gage of the wire. The main drive shaft is mounted in bronze sleeve type bearings. Intermediate and roll shaft gears are cut steel, hardened. The roll shafts are chrome nickel steel, heat treated, accurately machined and ground. The machine is arranged for direct connection to electric motor through chain drive. Motor platform is included and customer's motor is mounted if desired. Motor drive is enclosed in suitable guard. Machine carries set of tool steel rolls, accurately machined, hardened and ground, with passes cut for three sizes of wire.

Portable Sprayer

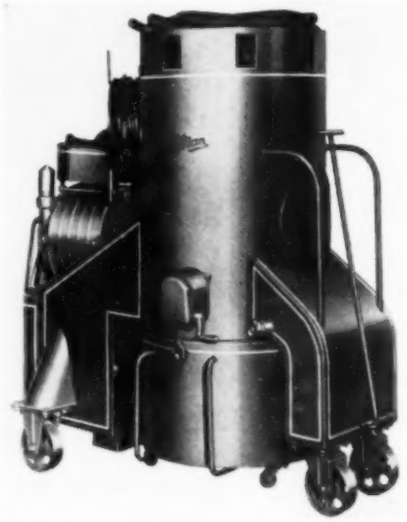
H. D. Hudson Mfg. Co., 560 East Illinois street, Chicago, has developed a knapsack type sprayer for laying dust in foundries and other industrial establishments. The device, shown in the accompanying illustration, is carried easily with wide adjustable shoulder straps on the back of the operator. Pump mechanism is operated by a right hand lever providing easy action and full pressure until the tank is empty. The spray is directed by the left hand, enabling the operator to move around the floor with ease. The 4-gallon tank has a removable top for easy filling. Adjustable nozzle assures fine breakup of spraying oil to hold the floor dust. Automatic shutoff insures effective and efficient use of oil.

Tank has capacity of four gallons and is adjusted easily by shoulder straps

Vacuum Cleaner

United States Hoffman Machinery Corp., New York, has developed a new type portable vacuum cleaning unit which is designed for removing large quantities of dust without having to stop and empty the dust container. The unit, which is shown in the accompanying illustration, is equipped with a dust container attached to a raising and lowering device actuated by a crank handle. It is mounted on a separate set of wheels independent of those on which the unit is moved, and the unit pull handle can be detached and used to pull the container.

The unit also has provision of carrying space for the hose and all cleaning tools and accessories, including a box for cleaning tools, compartment for floor and wall rods, rack for vacuum hose, and special saddle for the electric cord. The cleaning unit has sufficient capacity to operate two lines of 1½-inch hose of different lengths simultaneously, or one line of 2-inch hose. The unit may be employed in small or large plants.



Portable vacuum cleaner may be used for long periods of time before the dust container must be emptied

Microscope

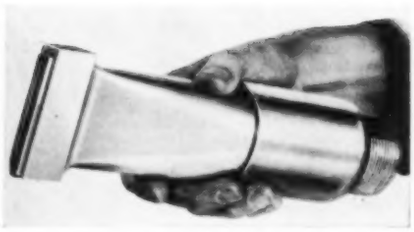
The device, shown in the accompanying illustration, is a comparison microscope recently introduced by the George Scherr Co., New York, and is designed for examination and comparison of the grain structure of metals and alloys, machined surfaces, etc. As shown in the illustration, the arrangement is such that when looking into the eyepiece, the magnified image and the standard specimen appear beside each other without any separation, making it possible to secure an accurate and reliable comparison.

Magnified image and standard specimen appear beside each other without any separation

By shifting a button, the image of the standard is withdrawn, permitting examination of the specimen in the full field of view. Efficient illumination of both specimen and standard is provided by two built-in frosted bulbs arranged in such a way that images appear in the eyepiece as a flat field, even when cylindrical surfaces are examined. Bulbs are supplied for either 110 or 200 volts so that connection can be made to the main line without rheostat or transformer.

Abrasive Gun

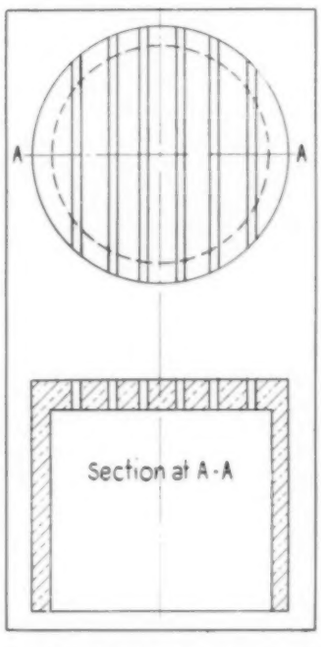
A new abrasive blast gun manufactured by Michiana Products Corp., Michigan City, Ind., is said to incorporate features of design and principle which provide better surfaces for painting and finishing wood and steel rapidly without injury. The gun, which is shown in the accompanying illustration, may be connected to any 80 to 100-pound air line, and contains a chamber in which the abrasive meets a baffle. The latter sets up a whirling motion reducing the abrasive particles and increasing the number of particles. Abrasive is delivered under pressure through a flattened orifice fitted with abrasive-resistant alloy-steel lips which produces a flat stream of abrasive under pressure.



Abrasive blast gun incorporates new features of design

Corebox Vent

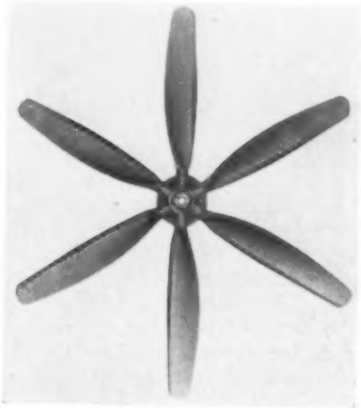
C. M. Smillie & Co., 520 East Larned street, Detroit, has developed an air release vent for coreboxes used in connection with core blowing machines. A sketch of the device, greatly enlarged for clarity is shown in the accompanying illustration. The device is a short brass cylinder with slots milled in the closed end. All slots are 0.010-inch in width. The actual number of slots depends on the diameter of the cylinder, which is available in a wide range of sizes from ⅛ to ⅞-inch diameter. The head is 0.093-inch thick thus allowing the vent to be machined to fit any desired contour without removal from the plate or box. It is claimed that these vents placed at strategic points in the corebox or plate will prevent drops, or formation of pockets and uneven contours on the cores.



Top and sectional view of vent plug greatly enlarged

Propeller Fan

Hartzell Propeller Fan Co., Piqua, O., has developed a new, tear-drop cross section. propeller fan blade which is said to operate at half the tip speed of the usual propeller-type fan without loss in air delivery. Tests indicate that air delivery holds up against pressure above normal expectancy. Reduction in speed plus design of the air-foil section reduce noise. Two types of fans will be available including the single-propeller style up to 55-inch diameter, and adjustable pitch fans from 44-inch up to 11-foot diameters. The latter may be had with 2, 4, and 6 blades. It is claimed that the adjustable pitch, removable blade fans permit meeting of requirements for different air deliveries against different pressures.



Fan operates at half the tip speed without loss of air delivery

Resists Heat

A paint has been developed which it is claimed will withstand temperatures of more than 3000 degrees Fahr. without undergoing change or losing color. Consistency of the material is similar to that of any other paint, and it can be brushed or sprayed, or the articles can be coated by dipping. No special thinners are required, and when dry the paint forms a hard, heat and abrasion resisting surface which will not chip off. It may be used for protection of fire bricks and other fireclay articles. It is said to possess a high thermal conductivity, and it seals cracks, thus increasing the efficiency of the furnace. It may be used on electric furnaces, as an insulator. The paint is being marketed by K. Bader, Westmoreland road, London, England.

Metal Cutting Saw

A new metal cutting band saw recently developed by the Delta Mfg Co., 600 East Vienna avenue, Milwaukee, and shown in the accompanying illustration, is designed for a wide range of operations. It can be used in the tool room, machine shop, pattern shop, ornamental metal shop and foundry and other general industrial applications. The machine can be used for cutting templates, for experimental work, sheet metal sawing, for sawing jig and fixture bases and similar parts, fitting light structural sections and extruded shapes, trimming gates on castings, sawing plastics, etc.

Machine has five speeds for cutting wood or metal

The band saw is of 14-inch capacity and will cut materials up to 6 inches thick. With an extension attachment the capacity under the guide can be increased to 12 inches if necessary. The machine has five speeds; four for metal 125, 175, 250 and 340 feet per minute and one for wood 2200 feet per minute. The slow speeds are obtained through a ball bearing gear box. The wood speed is obtained direct from a motor by a *V*-belt drive. Change from low to high speed is accomplished simply and easily.

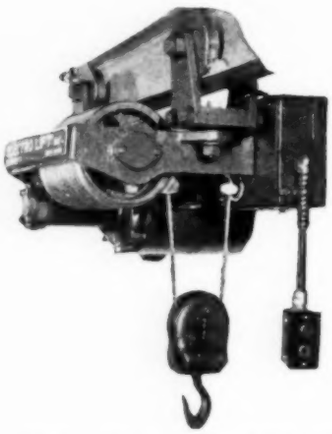
New Snow Plow

Easton Car & Construction Co., Easton, Pa., has developed a snow plow which it is claimed can be attached in 5 minutes to the platform of any high or low lift industrial truck. The device is intended for the removal of snow from factory yards, piers, docks and similar locations where trucking passages must be kept clear. Snow can be pushed to either side of the runway or straight ahead by adjusting the blade in the proper position. The blade is mounted on a pivot and equipped with a shear pin to release the blade when a solid obstruction is met. Ordinary shocks are absorbed by a spring which can be preloaded to suit conditions. Adjustable shoes on the bottom provide a riding support for the blade. The blade can be raised or lowered. The standard blade is 14 inches in height and 54 inches in width. A standard clamping device provides for adjustment.

Rope Guide Hoist

Electro Lift Inc., 30 Church street, New York, has introduced a new rope guide hoist designed especially for side and end pulling, or wherever the loads cannot be brought directly under the hoist.

The unit has a drum with deep grooving, which allows the cable to be submerged completely within the grooves. It is fitted with a traveling guide having a finger which runs in the groove ahead of the cable and which holds the cable in its proper groove. It is claimed that the hoist eliminates the hazards of crossed or piled up cables, thus increasing the cable life, particularly where loads are pulled at an angle to the vertical.



The cable is submerged completely within the grooves

The hoist is built in sizes ranging from ½ to 5 tons capacity and has the speeds and ratings of standard hoists made by that company. It has worm drive with worm and wheel running on tapered roller bearings enclosed within the gear case and running in oil. The load is carried on a rigid cast steel frame. The hoist has close headroom allowing the hook to reach within a short distance of the overhead track. It has a safety type hook block with a guard which encloses the bottom sheave. The hoist is built in both single and twin hook types, the latter for handling long loads. The control may be either rope or push button type, and top and bottom limit switches also may be provided to stop the load in each direction of travel, preventing running the cable off the drum.

Drinking Fountain

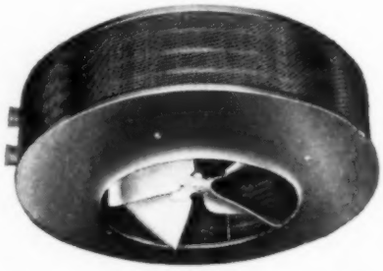
Crane Co., Chicago, recently has placed on the market six new drinking fountains for factory and office use. They are made of vitreous china and sculptured in a modernistic design that is claimed to be rugged, attractive and easy to keep clean. One line is offered in three models, one of which with integral strainer is equipped with two bubblers, automatic stream regulators and improved self-closing valves and loose key stops. Other models include single bubbler with a push button, self-closing ice water faucet and also a combination bubbler and ice water faucet with glass receptor.

Another type with two bubblers is similar to those described except that it is the roll rim type supported on brackets. A third line comprises two fountains with the supply and waste fittings concealed in a housing to improve appearance and eliminate condensation. Both have vitreous china backs, and they may be obtained with ice water faucets if desired. In all fountains the bubblers are located above the rim to avoid back siphonage.

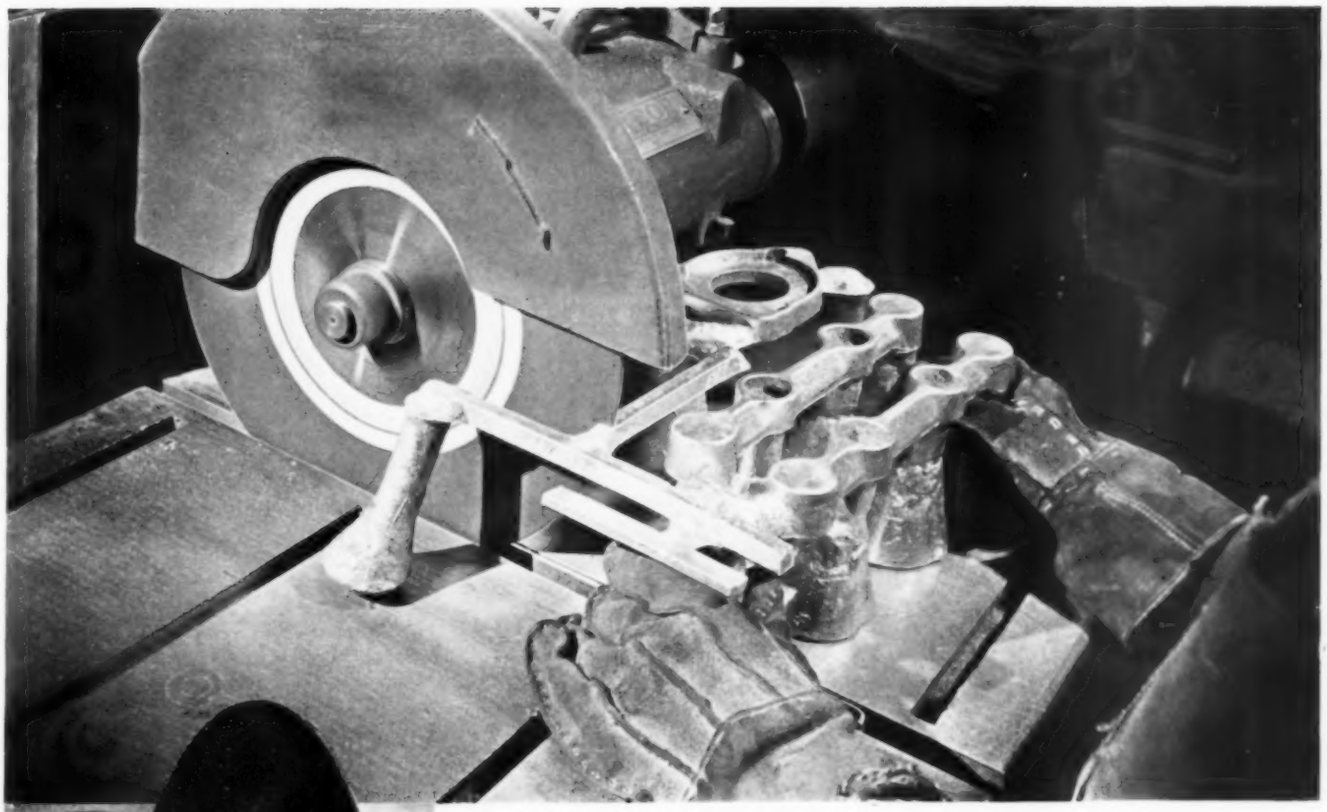
Projection Heater

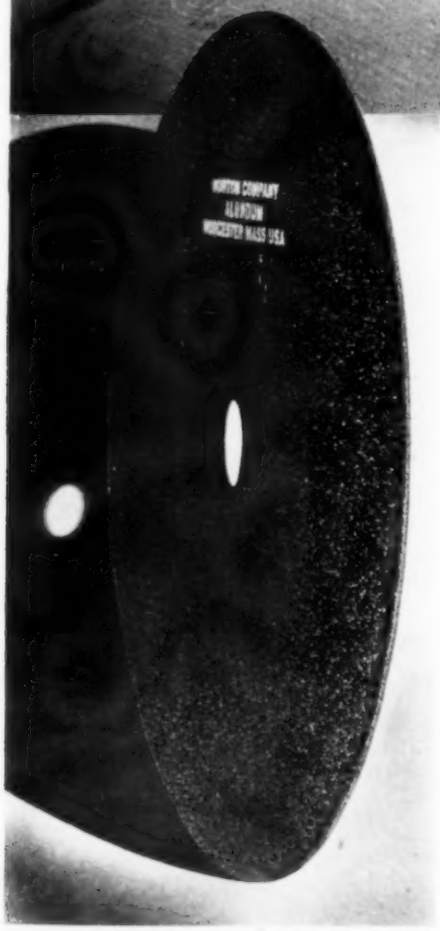
Trane Co., La Crosse, Wis., recently has developed a new projection heater. It is a light weight, compact, high velocity unit of the propeller type, and is designed for conveying the warm upper air in a building down to the floor. Structurally the unit consists of a 2-row circular coil mounted between two circular plates. The upper plate is the supporting backbone of the unit while the lower provides the orifice through which the fan discharges. The motor is mounted out of the direct path of the air on a 3-point resilient construction.

The unit is designed primarily for ceiling mountings where the warm upper air is drawn through the coils and then projected straight down to the floor by a 4-blade propeller fan. It is said that the fan provides velocity equal to that obtainable with blower types, and excessive ceiling temperatures are reduced so that a greater uniformity and evenness of room temperature is achieved.



Projection heater is designed to convey upper air in a building to the floor





Use a modern
production tool

NORTON CUT-OFF WHEELS

for quickly and economically cutting sprues, risers and gates from various types of castings.

NORTON COMPANY, WORCESTER, MASS.

New York Chicago Detroit Philadelphia Pittsburgh
Hartford Cleveland Hamilton, Ont. London Paris
Wesseling, Germany Corsico, Italy

W-627

NORTON ABRASIVES

Hand Protection

A new type of protective treatment for the hands of industrial workers is being marketed by the Davis Emergency Equipment Co., New York. It consists of two different creams; one for protecting the hands during work, and the other for use after work. The first cream is rubbed into the hands and on the arms if required, before starting work, and it forms an invisible, nonsticky film which is said to protect the skin from action of chemicals, solvents, grease, oil and gasoline.

When the hands are washed at noon time and night, the film comes off easily, carrying with it all dirt, grease, etc., and leaves the hands smooth and clean without use of abrasives. The second cream is applied after finishing work for the day, and is said to replace the natural oils of the skin; keeping the hands soft and free from chapping and cracking. That cream also is used by those whose hands are constantly wet with water since the first mentioned cream is not suited to provide protection against effects of water and aqueous solutions.

Truck Hoist Body

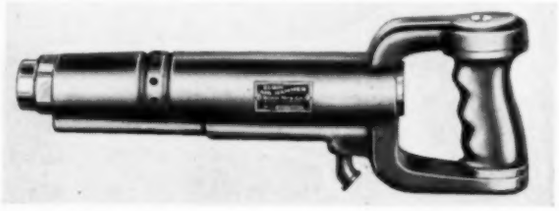
Kyle Sales Co., Decatur, Ill., has introduced a hoist for application to general utility truck bodies. The lifting action is accomplished by segmented jacks which lock into absolutely rigid struts or tension members and are unwrapped, section by section, from triplex pin spiders. The power of the jacks is the same in either tension or compression, and they lock the body automatically at any position.

The hoist is driven from a conventional power take-off applied to the transmission through two universal joints to a bronze worm reduction gear. A hand hoist of the same type is available, which has no worm gear, but is locked with pawls rather than the worm.

Pneumatic Hammer

Borm Mfg. Co., Elgin, Ill., has placed on the market a new triggerless pneumatic hammer, which is operated by pushing the hammer against the work. An added feature of the hammer which is shown in the accompanying illustration, is a tool holder which locks the tools in position, eliminating the necessity of holding the tools while working with the hammer.

Standard hexagon tool shanks are machined around their circumference to provide a ring groove a short distance from their ends. Retaining balls in hammer sleeve engage this groove. The sleeve itself is backed up by a spring which presses it toward the nose of the hammer and permits a valve-lifting ball to ride in a sleeve recess where it is inoperative with respect to a valve-lifting push rod. When the hammer is pressed forward with the end of the tool against a resisting surface, the tool and sleeve move inward against the action of the spring, causing the ball to raise the push rod and open the valve.



Triggerless pneumatic hammer is operated by pressing against the work

Hammer comes in three models. One is suitable for general purpose applications and will handle star drills up to 1-inch in diameter. It also is suitable for light chipping and scaling. The second handles 1¼ inch star drill and the third model takes a 1¾ inch drill. Weight of the hammer is about 13½ pounds.

Welding Rod

Air Reduction Sales Co., New York, has developed a new high ductility alloy steel, gas welding rod which is said to result in increased ductility and general improvement in quality of both single and multilayer steel welds. Physical characteristics of the new rods are claimed to show free bend ductilities of single layer welds ranging from 20 to 30 per cent depending upon the composition of the steel, free bend ductilities of multilayer welds up to 40 per cent on low and medium carbon steels, and ultimate tensile strengths in excess of 60,000 pounds per square inch. Specific gravity of welds is from 7.80 to 7.86. Charpy impact values on keyhole notched specimens at 70 per cent Fahr. are from 15 to 30 foot pounds, and Rockwell hardness of weld metal is from B60 to B85, depending on carbon content of base metal and type of weld.

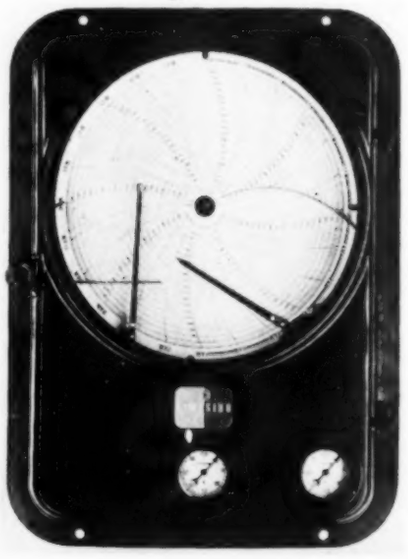
Air Compresser

Sullivan Machinery Co., Michigan City, Ind., has introduced a new air or gas compressor in displacement sizes of 378, 480, 642 and 800 cubic feet per minute. Features claimed are economy of power, maintenance, investment, installation and space. The unit is a continuous heavy duty machine which, while built for any type of drive, is said to have the greatest efficiency with the built-in motor. Thus equipped, the compressor requires only 6 x 8 feet of floor space for any of the capacities listed. The compressor is equipped with dual-cushion valves.

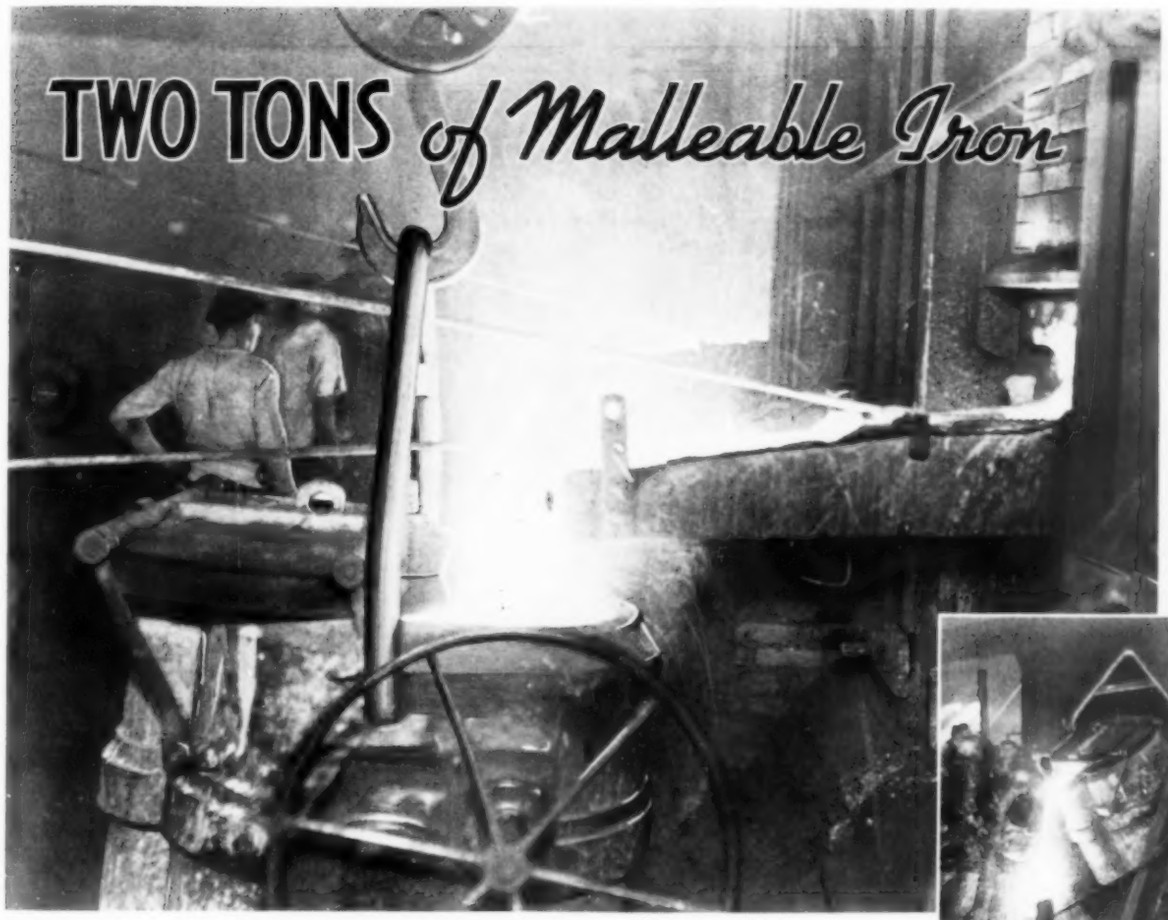
Pyrometer

A round-chart pyrometer has been developed by the Bristol Co., Waterbury, Conn., and is known as the pyromaster controller. It is a potentiometer pyrometer which is said to operate on a simplified principle, and is available in both pneumatic and electric types. The instrument employs standard thermocouples and extension leads, and is for direct ink-marking on a round 12-inch chart, or for indicating on a large scale.

The instrument, shown in the accompanying illustration, is claimed to require no lubrication; not to be affected by plant vibration, and that there is no mechanical motion except when a change in the measured temperature occurs. The potentiometer pyrometer controllers are automatically self-balancing and self-compensating for cold-end temperature changes. The pen arm or indicator is actuated in small steps that follow each other at a rate depending upon the rate of change in the temperature at the thermocouple. Thus it is claimed, all lag is eliminated, permitting immediate response to change as they occur. Instruments are available as recorders, recorders with indicating scale, recorder controllers, and recorder controllers with indicating scale.



Potentiometer pyrometer is available in pneumatic and electric types



distributed in

MODERN COVERED and INSULATED LADLES

to the light work pouring floors, a daily procedure at the Fort Pitt Malleable Iron Company, McKees Rocks, Penna. These ladles enable considerable savings through the transportation of so large an amount of metal in one ladle.

However, as Mr. E. E. Griest, Vice Pres. & Gen. Mgr. of this foundry says:

"The advantages to the pourers when catching iron from this ladle alone justify its use through their protection from the radiated heat. Also the ease of control of the iron has been impressive. We are filling 175 lb. ladles in very little more time than is required to fill a 50 lb. ladle and the absence of spills has been particularly advantageous."

Modern Covered and Insulated Ladles can be applied to your needs profitably. Send now for MODERN Catalog describing these ladles.

MODERN

Covered and Insulated Ladles

Lifetime Geared Ladles

Improved Bottom-Pour Ladles

Metal Pouring Systems

Crane and Monorail Systems for Metal and Mold Handling

Furnace Charging Cranes

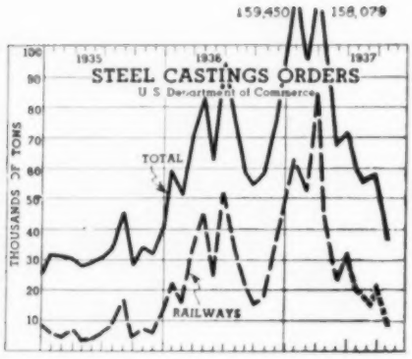
Sand Conditioning Systems

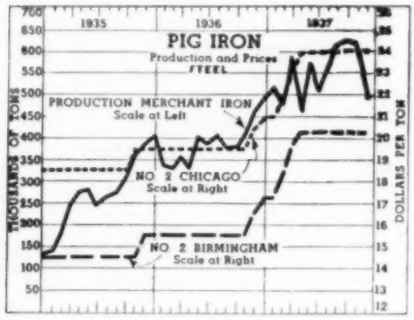
Patented & Patents Pending

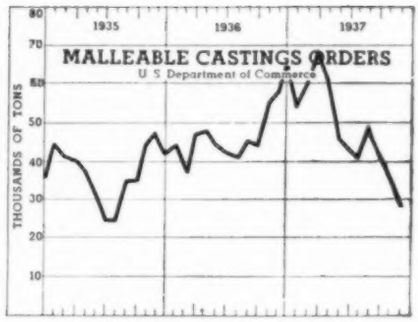
MODERN EQUIPMENT COMPANY

FORT WASHINGTON, WIS., DEPT. 138

MODERN EQUIPMENT CO.







FOUNDRY ACTIVITIES

BINNEY CASTINGS CO., Toledo, recently has moved into a new plant on Dorr street near the New York Central railroad. The new plant is air conditioned for both summer and winter. It was constructed by the Austin Co., Cleveland.

* * *

Jenkins Bros. Inc., Bridgeport, Conn., is planning an addition to its foundry.

* * *

Clarence R. Howlett, Mishawaka, Ind., has opened a wood and metal pattern shop at 2510 Lincoln way, West.

* * *

Mailloux Foundry Co., Grand'mere, Que., Canada, recently was damaged by fire. Loss was estimated at $5000.

* * *

Highway Trailer Co., Edgerton, Wis., manufacturers of auto trucks and trailers, is planning construction of a new factory building.

* * *

Valley Bronze & Machine Works, Webster City, Iowa, recently has been acquired by W. A. McCollough & Sons Inc., makers of tank heaters, etc. The foundry will be used to produce castings for the company and also for commercial work. George Wilhelm, one of the former owners of the Valley Bronze & Machine Works will remain with the McCollough organization as foundry manager.

* * *

Salem foundry, Salem, Ark., located in a building owned by John Pickren, recently was damaged by fire.

* * *

Dominion Foundries & Steel Ltd., Depew street, Hamilton, Ont., Canada, plans a water main and oil line at an estimated cost of $30,000. F. A. Sherman is general manager.

* * *

Kenosha Foundry Co., Kenosha, Wis., has been incorporated by Thomas G. Harvey, E. Monteen and Mrs. E. Monteen to engage in the manufacture of gray iron castings.

* * *

American Crucible Products Co., Lorain, O., is planning to build a plant addition to cost approximately $40,000. F. J. McFadden is architect.

* * *

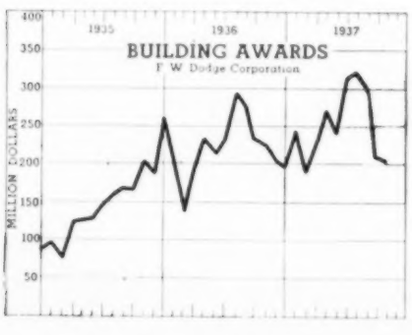
Index of foundry equipment orders for November was 128.03 as compared with 185.2 in October and 200.4 in November, 1936. Index of

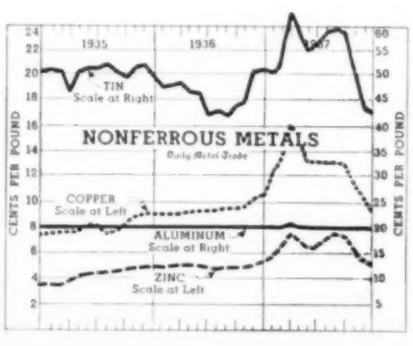
(*Concluded on page* 98)

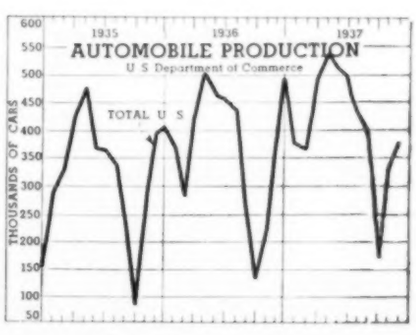
RAW MATERIAL PRICES

Dec. 30, 1937

Iron	
No. 2 foundry, Valley	$24.00
No. 2 Southern Birmingham	20.00
No. 2 foundry, Chicago	24.00
No. 2 foundry, Buffalo	24.00
Basic, Buffalo	23.00
Basic, Valley	23.50
Malleable, Chicago	24.00
Malleable, Buffalo	24.50
Charcoal iron, furnace	27.00
Coke	
Connellsville beehive premium	$ 5.75 to $ 6.25
Wise county beehive coke	5.50 to 6.50
Detroit by-product delivered	11.10
Scrap	
Heavy melting steel, Valley	$13.50 to $14.50
Heavy melting steel, Pitts. (dlv.)	13.50 to 14.00
Heavy melting steel, Chicago	13.00 to 13.50
Stove plate, Buffalo	11.50 to 12.00
Stove plate, Chicago	8.50 to 9.00
No. 1 cast, New York	12.00 to 12.50
No. 1 cast, mchy., Chicago	12.50 to 13.00
No. 1 cast, Pittsburgh	16.00 to 16.50
No. 1 cast, Philadelphia	16.00 to 16.50
No. 1 cast, Birmingham	14.50 to 15.00
Car wheels, iron, Pittsburgh	15.00 to 15.50
Car wheels, iron, Chicago	14.50 to 15.00
Railroad malleable, Chicago	14.50 to 15.00
Malleable, Buffalo	14.00 to 14.50
Nonferrous Metals	**Cents per pound**
Castings copper, refinery	9.65
Straights tin	41.12½
Aluminum, 99 per cent	20.00
Aluminum, No. 12 (Secondary, standard)	17.00 to 17.50
Lead, New York	4.75
Antimony, New York	13.75
Nickel, electro	35.00
Zinc, East St. Louis, Ill.	5.00







between you and the men who can help you boost sales!

■ Every busy executive is forced to erect somewhat of a defensive barrier between himself and the salesmen who call on him. Though his latchstring is out to all of them, his own sales problems are hidden from the majority. Yet there is one group of men who, once allowed to penetrate that barrier, can render real sales-upping aid. They are the representatives of the strong business papers possessing a thorough, intimate knowledge of the markets they serve. Given the chance, they can help you lick your sales problems.

And they are responsible men, representing responsible publications such as those which banded together twenty years ago to form The Associated Business Papers, Inc. Ethically administered, vigorously edited, these industrial, trade and professional papers have become the pacesetters of business paper publishing. They devote themselves so diligently to the subscribers' interests that they actually deliver "packaged influence" to a "conditioned" audience of proved buying capacity. There's bound to be a real money's-worth of advertising value in business papers that employ highly-trained editors whose sole obligation is to glean and interpret important events, to advance practical ideas, and to render a tangible service to readers who want it enough to pay for it!

MEMBER AUDIT BUREAU OF CIRCULATIONS

Impartial measurement of reader interest in terms of paid circulation

THE TWIN-HALL MARKS OF KNOWN VALUE

ABP

Authentic facts relating to editorial scope and readership analysis

The Foundry is a member of the A. B. P. Its representatives are sincerely anxious to give you the benefit of their specialized experience. So next time The Foundry man calls, invite him behind that barrier . . . avail yourself of the many ways in which he is ready, willing and able to work for you

TWELVE WAYS
THE FOUNDRY REPRESENTATIVE
CAN HELP YOU:

1. To sense and evaluate significant trends.

2. To determine market potentials.

3. To suggest product or package changes.

4. To help you select and reach your prime prospects.

5. To help plan sales and advertising strategy.

6. To aid in improving sales and distributive setup.

7. To translate all available market and sales statistics into terms of your particular problem.

8. To scan copy for trade jargon.

9. To suggest new products, or new markets for old products.

10. To suggest ways to make sales promotion more effective.

11. To help devise practical merchandising material.

12. To point out specific sales opportunities.

THE FOUNDRY
CLEVELAND

(*Concluded from page* 96)

shipments was 178.8 for November as compared to 232.3 in October and 150.9 in November of last year.

* * *

B & B Machine & Iron Works, 801 Broadway, S., Oklahoma City, Okla., has been succeeded by the Steel Sales & Supply Co. Inc., 2-12 West Ottawatomic, Oklahoma City.

* * *

Magnus Metal division of National Lead Co., St. Louis, is erecting a building to be used for a pattern and machine shop and for the production of nonferrous metals, according to L. J. Lyons, plant manager.

* * *

Beloit Brass Works, Beloit, Wis. recently has been taken over by O. A. Hillery, Beloit, who will operate it as a jobbing foundry. The company name has been changed to the Superior Brass Foundry.

* * *

Sternaman Pattern Shop, Flora, Ill., has been moved to Springfield, Ill. and merged with the John R. Sternaman Pattern Works, 445 Williams boulevard. The new organization will be known as the Sternaman Pattern Works.

* * *

Sterling Aluminum Products Co. Inc., 2914 North Market street, St. Louis, is constructing a new plant at 2925 North Market street to manufacture aluminum pistons. Total cost of plant, machinery and equipment is $60,000.

* * *

Western Malleables Inc., Beaver Dam, Wis., in receivership since early in 1937, has been sold after an unsuccessful effort at reorganization. No indication of the probable use of the three plants has been given.

* * *

B. H. Garhart Foundry Co. Inc., formerly the Petroleum Car & Foundry Co., whose Fairfax district plant recently was destroyed by fire, has opened at a new location, at 10 Shawnee avenue, Kansas City, Kans. The plant has two cupolas with a capacity of 50 tons per day. B. H. Garhart is president.

* * *

Stiglitz Furnace & Foundry Co., 2007 Portland avenue, Louisville, Ky., has purchased the patterns, flasks and equipment of the Kentucky Stove Co. which has manufactured stoves in Louisville for the past 40 years. The Stiglitz company will revive the entire line and will furnish repair parts for the stoves.

* * *

Production of gray iron and steel castings in the Philadelphia Federal Reserve district decreased during November, according to reports of the Industrial Research department, University of Pennsylvania. Output of gray iron castings was 25.6 per cent less than in October and steel castings output dropped 9.3 per cent. Shipments of iron castings were one-fifth less than the previous month, but steel castings shipments rose slightly over 6 per cent. Unfilled orders declined considerably.

Book Review

House Wiring, by Thomas W. Poppe, cloth, 256 pages, published by Norman W. Henley Publishing Co., 2 West Forty-fifth street, New York, and supplied by THE FOUNDRY, Cleveland, for $1.00 and in Europe by the Penton Publishing Co. Ltd., London.

This pocket size book contains 191 illustrations and is the eighth enlarged and revised edition. It contains substantially complete information concerning the wiring of a house or other building from start to the finish of a job. Illustrations are taken as typical examples of the work and aid materially in giving a clear understanding of each operation.

NEW TRADE PUBLICATIONS

Copies of any of the literature listed below may be obtained by writing directly to the companies involved, or by addressing THE FOUNDRY, in care of Readers' Service Department, 1213 West Third Street, Cleveland

VENTILATION—H. H. Robertson Co., 2000 Grant building, Pittsburgh, has published an interesting bulletin on its method of providing ventilation for foundries. Drawings show the results to be obtained through the application of the method employed by that company. Information also is given on the services rendered by that organization, and the features provided by what is called the Robertson Way, including control of ventilation, control of daylighting and control of maintenance and replacement.

HEATING—Unit Heater & Cooler Co., Wausau, Wis., has published a folder on its line of grid unit heaters to improve fog conditions in a foundry.

PUMPS—W. F. and John Barnes Co., Rockford, Ill., has published a folder on its piston feed pump for the application of hydraulic power.

ALLOYS—Alloy Metal Wire Co. Inc., Prospect Park, Pa., has published a handbook of information and data on alloys, of particular use to users of wire, rod and strip in the electrical and mechanical fields.

WELDING—Hobart Bros. Co., Troy, O., has published a catalog on its new 40-volt arc welding machine. Photographs are reproduced to show construction and application.

SPRAYS—Binks Mfg. Co., 3114 Carroll avenue, Chicago, has published a new catalog giving engineering data and information on its line of watercooling towers and industrial spray nozzles.

INSULATION — Continental-Diamond Fibre Co., Newark, Del., has prepared a 20-page booklet on its bonded mica insulating material. Properties, specifications and uses are featured.

LUBRICATION—No. 4 of a series of booklets entitled "Panorama of Lubrication," published by the Shell Petroleum Corp., deals with diesel engines and their lubrication.

STELLITE—Haynes Stellite Co., Kokomo, Ind., has published a booklet entitled "The Haynes Stellite Library," which gives a list of books and reprints available for distribution.

CORE MACHINE—American Foundry Equipment Co., Mishawaka, Ind., has published a folder on its extrusion type core machine. Use of the machine in producing stock cores is stressed.

ZINC—New Jersey Zinc Co., 160 Front street, New York, has published two bulletins, one entitled "Zinc Alloy Die Castings in Electrical Equipment," and the other, "Zinc Alloy Die Castings in Business Machines."

DEOXIDIZERS—A deoxidizing agent for use in brass, bronze castings is described in a folder of the Durametallic Corp., Kalamazoo, Mich. Information is presented on methods of using the deoxidizer.

MOLDING MACHINES—SPO Inc., East Sixty-first and Waterman avenue, Cleveland, has published a catalog on its line of molding machines and foundry equipment. Detailed specifications of various machines are included.

MACHINE TOOLS—In celebrating its fiftieth year of service to industry, the R. K. LeBlond Machine Tool Co., Cincinnati, has published an interesting and well-illustrated booklet entitled "What Makes Main Street?".

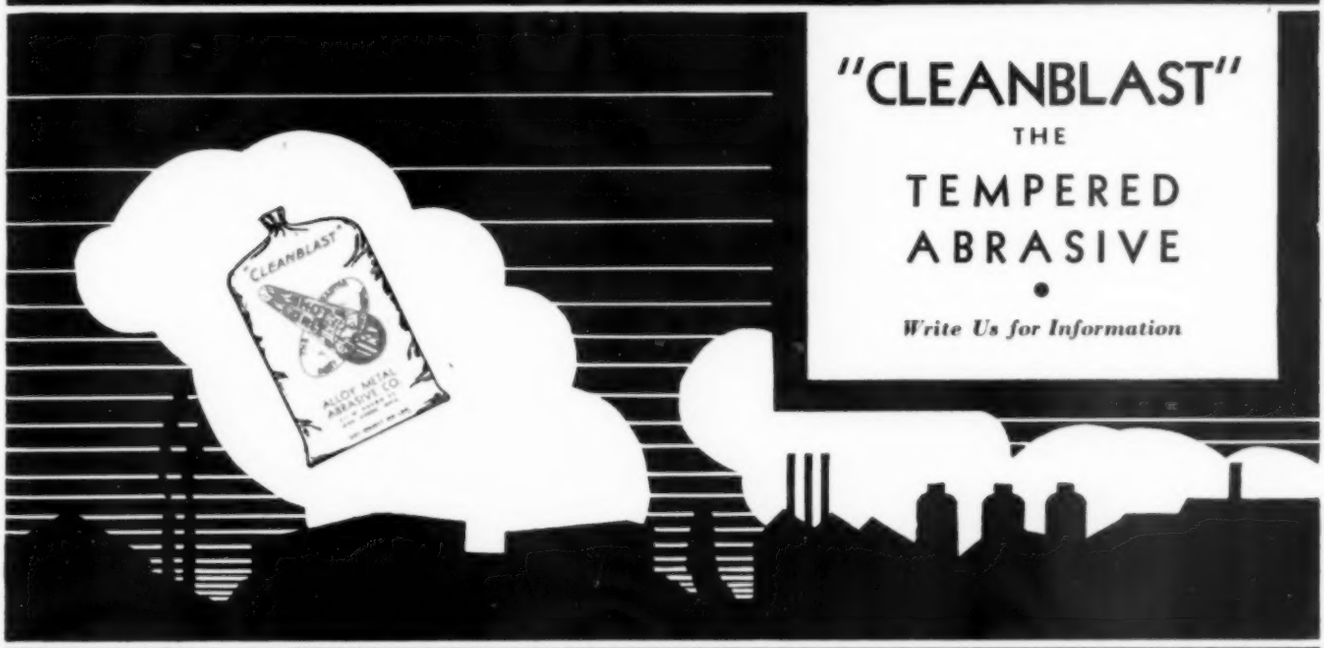
PYROMETERS — Brown Instrument Co., Philadelphia, has published catalog No. 1102 on indicating, recording and controlling potentiometers and millivoltmeter types of pyrometers.

(*Continued on page* 100)

Faked Foundry Facts

Lifting Screws

SHOT "CLEANBLAST" GRIT



ALLOY METAL ABRASIVE COMPANY
311 W. HURON ST.,
ANN ARBOR, MICH.

Have you seen the
CLEARFIELD
VERTICAL HOIST LOADER?

Minimum head-room — minimum floor space—simpler to operate—

This loader plus the CLEARFIELD Sand Mixer makes a great sand conditioning unit. Loader capacities to suit mixer sizes.

CLEARFIELD MACHINE CO.
Clearfield, Pennsylvania

(*Continued from page* 98)

PORTABLE TOOLS—A 50-page catalog of Skilsaw Inc., 3310 Elston avenue, Chicago, describes its complete line of portable electric tools, including hand saws, drills, grinders, belt sanders, disk sanders, floor sanders, and blowers.

CLUTCHES—A 16-page illustrated catalog No. 1532 has been prepared by the Link-Belt Co., 307 North Michigan avenue, Chicago. Information includes sizes, dimensions, weights, horsepower ratings and other pertinent tabular data.

METAL CUTTING—W. O. Barnes Co. Inc., Detroit, recently has published an interesting 32-page booklet entitled "A Manual of Metal-Cutting Information." Information also is given on the products of the company.

ALLOYS—International Nickel Co., 67 Wall street, New York, has published a bulletin listing current publications on nickel alloy steels, nickel cast irons, nickel brasses and bronzes and other nickel alloys.

CUPOLA CHARGER—Folder No. 221 on its line of skip-hoist cupola chargers has been published by the Whiting Corp., Harvey, Ill. The advantages of the device are listed and described, and its operation explained.

WELDING RODS—American Manganese Steel Co. has issued bulletin No. 20 covering its hard facing welding rods. The bulletin illustrates a number of hard facing applications and contains several pages of suggestions for its proper application.

WELDING ELECTRODES — General Electric Co., Schenectady, N. Y., has issued a brochure entitled "Handy Estimator for Determining Arc-Welding Electrode Quantities." The tables covering various types of welded joints, are based on average conditions.

BLASTING EQUIPMENT — American Foundry Equipment Co., Mishawaka, Ind., has issued a well-illustrated folder on its wheelabrator cleaning equipment. Operation and advantages of the unit are discussed in detail.

SAFETY EQUIPMENT — Industrial Gloves Co., 733 Garfield boulevard, Danville, Ill., has published a catalog of safety apparel which includes gloves, mittens, hand guards, sleeves, leggings, aprons, and clothing. Illustrations show the complete line of safety apparel.

THERMOMETERS—A new industrial thermometer catalog has been published by the C. J. Tagliabue Mfg. Co., Park and Nostrand avenues, Brooklyn, N. Y. Information is given on construction of the instruments and a wide variety of applications.

SAND MIXING MACHINES—Beardsley & Piper Co., 2541 North Keeler avenue, Chicago, has published a folder on its speedmuller, for mulling, facing, backing or compound and oil core sands. Information is presented on details of construction.

BLAST CLEANING—American Foundry Equipment Co., 532 South Byrkit street, Mishawaka, Ind., has published a small booklet entitled "Wheelabrator Roll Call." In addition to a list of users of that type of blast cleaning equipment, photographs show typical installations.

UNIT HEATERS—Trane Co., La Crosse, Wis., has published two booklets on its heaters. The first, No. 294, deals with a multiple projection heater, and the second with a unit projection heater. A third publication of the company deals with its line of heating specialties.

SAND CONDITIONING — American Foundry Equipment Co., 531 South Byrkit street, Mishawaka, Ind., has published a folder illustrating and describing its sand cutter for conditioning molding sand. Features of design are pictured and explained.

TRUCKS—The Lansing Co., Lansing, Mich., has published its catalog No. 14 entitled "Keep Your Product on Wheels." Various types of wheelbarrows, industrial trucks, casters, wheels, etc., are described and illustrated. The catalog provides exceptional presentation of hand trucks and allied equipment.

CONTROL—Leeds & Northrup Co., 4902 Stenton avenue, Philadelphia, has published a catalog describing its triple-control method for heat treating steel. The catalog shows views of representative installations and diagrams, chart records and pictures of many types of tools and dies hardened by the method.

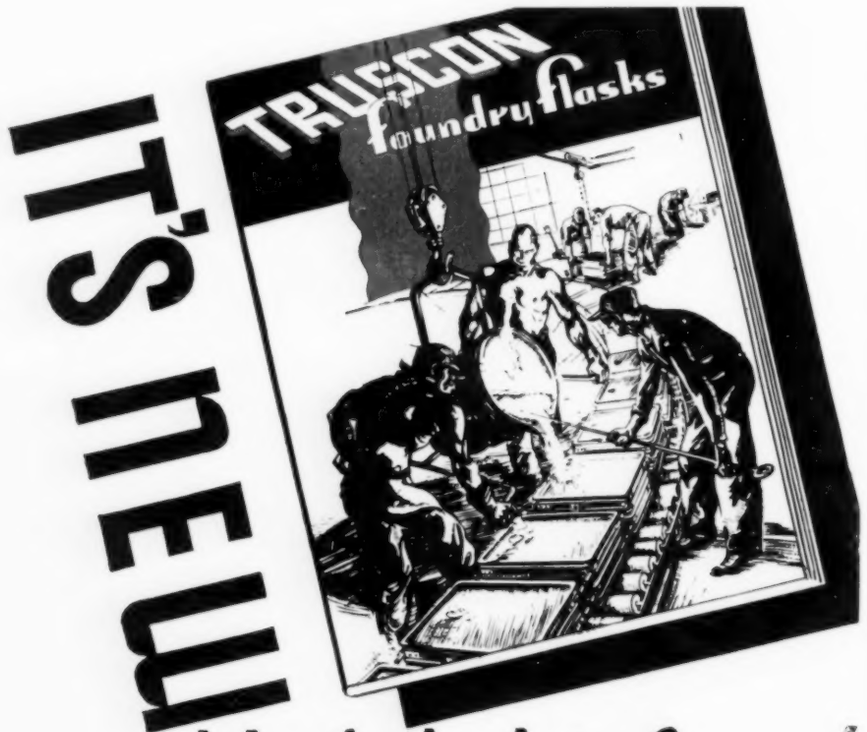
FANS — Northern Blower Co., 6409 Barberton avenue, Cleveland, has published bulletin No. 1002-3 dealing with high speed low power exhaust fans. The bulletin discusses the application of the fans to dust handling, construction and specifications, and also gives a high speed capacity table.

MICROSCOPES—Bausch & Lomb Optical Co., Rochester, N. Y., has published a bulletin on its wide field binocular microscope developed for general low power work. The unit is designed for industrial fields, for inspection of spot checking and in mineralogy for the study of mineral and fossil forms.

ALUMINUM — "Machining Aluminum and Aluminum Alloys" is the subject of a 32-page booklet recently issued by the Aluminum Co. of America, Pittsburgh. The booklet contains information on general machining practice, automatic screw machine practice, and tables of feeds and tolerances.

CUPOLA CONTROL—A folder of Ed-

(*Continued on page* 102)



IT'S NEW

and helpful to You!

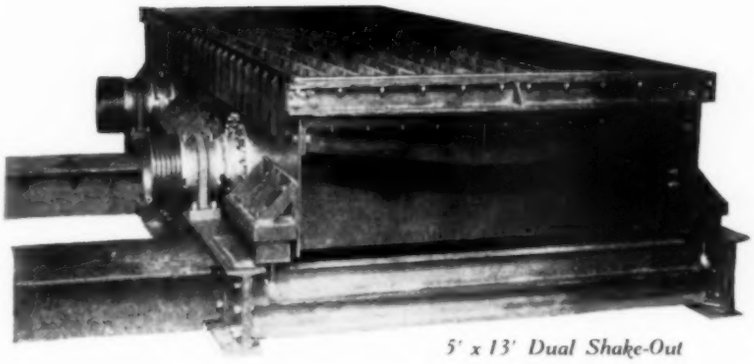
Facts about Truscon Copper Bearing Steel Foundry Flasks! Clearly told! Profusely illustrated! Here's a quickly read but authoritative guide to help you select the correct type of flasks for light, medium and heavy castings. Write TODAY for your FREE copy!

TRUSCON STEEL COMPANY • FOUNDRY FLASK DIVISION
6100 TRUSCON AVENUE • CLEVELAND, OHIO
SUBSIDIARY: Republic Steel Corporation

TRUSCON

COPPER-BEARING STEEL FOUNDRY FLASKS

• • Simplicity • •
FOUNDRY EQUIPMENT



5' x 13' Dual Shake-Out

The Dual Assembly Shake-Out or Knock-Out is designed to handle that extra heavy job, which now takes so much time in your shop. In addition to its increased load carrying capacity, it has many other important operating advantages which enable it to produce extremely valuable results. It will pay to investigate thoroughly.

"Recommendations based on experience guarantee proper service."

Simplicity Engineering Company

DURAND, MICHIGAN

For Canada: Waterous Limited, Brantford, Ontario

PANGBORN-NORBIDE★

"LONG-WEAR" BLAST CLEANING NOZZLES

Lined With the Hardest Material Ever Produced by Man for Commercial Use

Its greatly increased nozzle life means lower air consumption plus improved stream contour and velocity.

Materially reduces Blast Cleaning Costs on hand or automatic equipment. A size and type for every requirement.

GUARANTEE—750 hours with Sand—1500 hours with Steel Abrasives.

★Trade-mark of Norton Co. for Boron Carbide

PANGBORN CORPORATION

The World's Largest Manufacturer of Blast Cleaning and Dust Collecting Equipment

HAGERSTOWN - - - - MARYLAND

(*Continued from page* 100)

win S. Carman Inc., Lee road at Mayfield, Cleveland, presents the reasons for the application of the cupola control gage designed by that organization. Information also is given on the complete engineering services rendered by the company.

INSULATION—Johns-Manville, 22 East Fortieth street, New York, has published a booket No. GI-6A listing its line of industrial products. Information includes recommendations on high and low temperature insulations for industrial needs, specifications for asbestos roofs and insulated roofs, friction materials, etc.

DUST—Mine Safety Appliances Co., Braddock, Thomas and Meade streets, Pittsburgh, has issued a new booklet entitled "Pertinent Questions and Answers Concerning Dusts." An endeavor has been made to answer the questions in simple, and as far as possible, non-technical language.

COUPLINGS—Bartlett Hayward division of the Koppers Co., Baltimore, has issued a new catalog concerning Fast's self-aligning couplings. The 40-page catalog includes material on solving problems of misalignment, principles of lubrication, types of couplings and considerable other information.

FURNACES — A bulletin on its car-bottom furnaces for general heat treating purposes has been published by the Surface Combustion Corp., Toledo. Information presented includes operating data, a general discussion of the furnace, and information on controlled atmosphere furnaces for malleablizing

SUPPLIES—Foundry Services Inc., 107 East Forty-first street, New York, has published its bulletin on a line of products which includes materials for use in melting aluminum, in handling iron and steel and in producing brass, bronze and nickel alloys. Brief information on the various products provides the foundryman with an idea as to its uses.

MOTORS—Century Electric Co., St. Louis, has published a 24-page booklet giving information on the electrical characteristics and descriptions of all types of fractional horsepower motors, including repulsion start induction, split phase, capacitor, polyphase and direct current, which are produced by that company.

PYROMETERS—Pyrometer Instrument Co., 103 Lafayette street, New York, has published catalog No. 90 on its new bioptical pyrometer which is designed to measure the black body and actual color temperature simultaneously. The discussion includes information on the principle of operation and the application of the unit.

ALLOYS—International Nickel Co. Inc., 67 Wall street, New York, has published two technical information bulletins, one dealing with nickel and nickel-base alloys used in the design of corrosion resistant machinery and equipment, and the other discussing design and construction of heavy equipment in monel, nickel and inconel.

PRECIPITATOR—American Air Filter Co. Inc., Louisville, Ky., recently has issued a folder on its water spray dynamic precipitator for the control of foundry dusts, chemicals, pigments and other finely divided materials. Capacities, features, method of operation, characteristics and dimensions are included in this folder.

FURNACES—A well-illustrated booklet recently has been published by the Surface Combustion Corp., Toledo, O., featuring various types of furnaces for heating and heat treatment of metals. Several types of interest to the foundry industry including those for annealing, malleablizing, heat treating, etc. are illustrated and discussed.

FOUNDRIES—Beardsley & Piper Co., 2541 North Keeler avenue, Chicago, recently has published a booklet entitled "Foundries Around the World." Letters written by W. F. Piper on his trip around the world, and reproductions of photographs of foundries in many countries provide interesting and enjoyable reading.

DUST CONTROL—An interesting booklet entitled "The Dust Problem in Business," by F. A. Ebeling, recently has been published by the W. W. Sly Mfg. Co., 4700 Train avenue, Cleveland. The text deals with health as a means to profit in business, the importance of dust control methods, good housekeeping practices, combustion dangers, and the positive control of dust.

SAND TESTING—Harry W. Dietert Co., 9330 Roselawn avenue, Detroit, has published a new catalog No. 105 presenting its complete line of equipment for testing the various properties of molding and core sand in the foundry. The second section of the booklet deals with operating instructions and the third presents technical data including an outline of molding sand and the reasons for foundry sand losses.

HEAT—Johns-Manville, 22 East Fortieth street, New York, has published a booklet entitled "Heat" which presents the dramatic story of man's age-old struggle to control nature's most powerful force. It is divided into five chapters and covers the history of heat from ancient times; the discovery of what heat is, with full explanation of its nature; the science of heat conservation; modern materials available for

(*Concluded on page* 104)

D. S. M.
CORE BAKING OVENS

Selecting the right type of baking oven should of course be determined largely by your conveying or handling problem.

The conveyor and coremakers shown above are directly under a three pass horizontal continuous D.S.M. oven, 165 ft. long, in a large automotive foundry in Flint.

The monorail conveyor is loaded as it travels past the coremakers who are working at both sides of the conveyor. This oven is baking the output of between 30 and 40 coremakers. The product is uniform, whether loaded on the top tray or the bottom one. Small pin cores weighing about ten to the pound are baked on the same carriers which convey ten or twelve pound cores—and without burning or over baking. This is a result of proper air conditioning.

We advocate vertical ovens wherever practicable. But for certain core room layouts the overhead horizontal oven fits better.

DETROIT SHEET METAL WORKS
DETROIT - - MICHIGAN
1270 Oakman Boulevard

DIETERT DETROIT *Sand Testing* EQUIPMENT

MOISTURE TEST

The Moisture Teller with Balance is the most practical foundry test for moisture in molding sand. Place in foundry or sand laboratory. Uses large sample, is fast and low in cost.

Balance

Moisture Teller

Sand Rammer

Permeability Meter

PERMEABILITY TEST

Sand Rammer and Permeability Meter are used for determining the permeability of green and dry molding sand or baked cores. Permeability of molds may also be determined.

STRENGTH AND DEFORMATION TEST also MOLD HARDNESS

The Strength Machines measure the green and dry strength of molding sand, also the deformation of green molding sand. Strength of cores may be determined with the same machine. The Mold Hardness Tester measures the hardness of molds.

Strength Machine

Mold Hardness

Sand Washer

Sieves and Sifter

FINENESS TEST

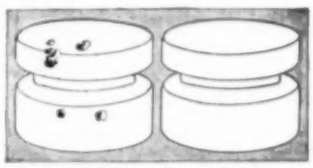
The Sand Washer is used in the clay content test to save time. A Clay Washer is available to automatically wash the clay out of a sand sample. The Sieves and Sifter as illustrated are used in obtaining the fineness of sharp and molding sand.

PRACTICAL — ECONOMICAL — A. F. A. STANDARD

Sand control pays dividends write to

HARRY W. DIETERT CO.
9330 Roselawn Ave.
DETROIT, MICH.

EVERY CASTING SAVED is MONEY EARNED

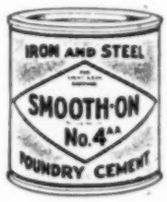


Before After

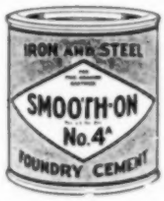
FILLINGS of Smooth-On No. 4 in sand holes, blow holes and other depressions which harm nothing but appearance make good castings better. The surface correction reclaims an astonishing tonnage, and the better value is equally welcome to the customer.

SMOOTH-ON No. 4

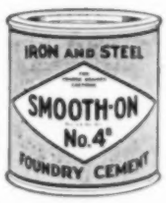
is applied like putty, grips like a weld when hardened, looks like iron because it is iron, expands and contracts like iron and can be filed like iron. Three grades offer a choice for perfect color, lustre and texture match on any iron or steel casting.



Smooth-On No. 4AA. For light gray castings and machined surfaces. Has high metallic lustre and takes a fine machine finish.



Smooth-On No. 4A. For medium gray castings. A fine grained cement that has a good metallic lustre.



Smooth-On No. 4B. For dark gray castings. A cement of coarser grain and darker shade.

These compositions applied in the usual way meet ordinary needs, but modification of lustre and shade is easily obtained by rubbing the *dry* powder on top of the applied filling. This lightens the shade.

The free *hardened* samples will show you the general effect, and application of the free *working* samples will prove that you *can* get perfect match—easily, quickly and cheaply.

FREE HARDENED and WORKING **SAMPLES**

Mail coupon for samples and prices. Smooth-On Nos. 4AA, 4A and 4B are packed in 1 lb. and 5 lb. cans, 25 lb. pails and 100 lb. kegs.

Smooth-On Mfg. Co., Dept. 17,
570 Communipaw Ave., Jersey City, N. J.

Please send *working* samples of
☐ Smooth-On No. 4AA ☐ Smooth-On No. 4A ☐ Smooth-On No. 4B
☐ Hardened samples of all three

Name .....

Address .....

1-38

Do it with **SMOOTH-ON**

ADVERTISING PAGES REMOVED

(*concluded from page* 102)

conserving heat; and illustrations of specific uses of these materials in individual industries.

NICKEL ALLOYS—International Nickel Co., 67 Wall street, New York, recently has published three bulletins. The first, "Nickel Alloys for High and Low Temperature Refinery Service," treats on high and low nickel-chromium alloys having good strength and creep resistance at elevated temperatures. The second is on "High Strength Corrosion-Resisting Rivets for Marine Construction," and the third deals with "Nickel Alloy Steels in Oil Well Tools."

CLAY BOND—Use of clay bond in modern foundry practice is discussed from many angles in a pamphlet recently issued by the Eastern Clay Products Co., Elfort, O. Following a brief historical introduction the pamphlet deals with use and disadvantages of new molding sand, general application of clay bond in gray iron and steel foundry practice, selection of silica grains, properties of clay, green strength, dry strength, refractory value, durability moisture range, uniformity, service, advantages of synthetic and rebonded sand.

LABORATORY EQUIPMENT — Precision Scientific Co., 1736 North Springfield avenue, Chicago, has issued its bulletin No. 200 on constant temperature laboratory equipment. Included in the booklet is a summary of the features applying to both gravity and mechanical convection model ovens, incubators, furnaces, humidity cabinets and low temperature dehydrating units. The various models of electrically heated constant temperature baths are pictured and described on the last two pages of the publication. A reprint on various kinds of sieves and bureau of standards sieve series and equivalents, together with information for ordering from the company's catalog, also has been issued.

PUMPS—Turbine pumps are described and illustrated in bulletin 260-B11C recently issued by the Roots-Connersville Blower Corp., Connersville, Ind. Special emphasis is placed on their wide application throughout the industrial field. Cutaway views are presented showing the various types of construction and the text discusses the numerous features. Another section of the bulletin is devoted to showing the various types of drives to which the pumps are adaptable. A detailed selection table is included with a brief discussion of the factors entering into proper selection.

Book Review

Gases and Metals, by Colin J. Smithells, cloth, 218 pages, 5½ x 8½ inches, published by John Wiley & Sons Inc., New York, and supplied by THE FOUNDRY, Cleveland, for $4.50, and in Europe by the Penton Publishing Co. Ltd., London.

In many branches of science and industry the behavior of gases and metals in contact is of fundamental importance, and gas-metal equilibriums are being studied from many viewpoints by different workers. Diffusion of gases in solid and liquid metals, and the solubility of gases in metals have a profound effect in the manufacture of metallurgical products. While the general principles underlying gas and metal equilibriums are established, the results obtained in various fields were widely scattered in scientific literature until the author gathered them together to form this book. In addition to that he shows the intimate connection between the different phenomena.

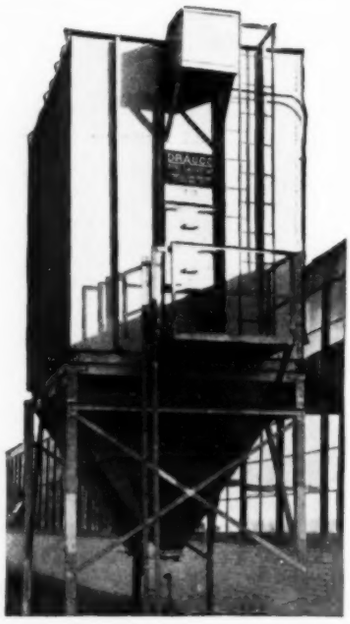
While the author does not make any attempt to deal with the practical application of the principles to metallurgical processes, the data presented in the book undoubtedly will aid in understanding and solving problems relating to gas and metal equilibriums. The book is divided into three chapters of which the first is devoted to adsorption. Chapter II discusses diffusion while Chapter III relates to solution. A subject index and a name index are included.

Pickle Solution

Industrial Chemical Products Co., Detroit, has introduced a pickle for removing tarnish and oxide film from the surface of brass. It is claimed that the product also imparts a durable and attractive satin finish. The pickle is a nonfuming acid solution made in concentrated form and diluted with three parts of water. It is used at room temperature. Articles to be pickled first are cleaned with a hot alkali cleaning solution and then immersed in the pickle dip solution. The article then is rinsed, preferably in hot water, and allowed to dry.

Make 1938 a BETTER YEAR with DRACCO DUST COLLECTORS

Get Bulletin No. 302



We claim that DRACCO Dust Collectors will make 1938 a better year for you because we know they have SAVED money and INCREASED efficiency for many. DUST has a distinct bearing upon the efficiency of your operations—the LESS DUST you have, the GREATER EFFICIENCY you will have. DRACCO Engineers, with over 20 years experience to draw upon, are especially qualified to give you sound advice on Dust Control. DUST is a handicap that should be removed AT ONCE!

YOUR Service Men PREFER DRACCO DUST COLLECTORS that are maintained ON THE CLEAN AIR SIDE

WORKED ON FILTER NOT MAINTAINED ON CLEAN AIR SIDE

WORKED ON FILTER MAINTAINED ON CLEAN AIR SIDE

• Write for Bulletin No. 302 •

DRACCO CORPORATION

4050 E. 116th St., Cleveland, Ohio • New York Office, 130 W. 42nd St.

PNEUMATIC CONVEYORS • DUST COLLECTORS